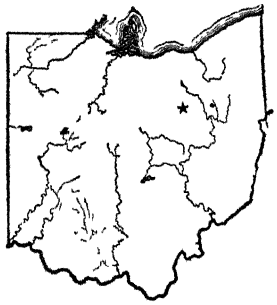
COUNTY EXPERIMENT FARMS IN OHIO

ANNUAL REPORTS FOR 1918 AND 1919

OHIO
Agricultural Experiment Station

WOOSTER, OHIO, U. S. A., JUNE, 1920

BULLETIN 344



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S. C. HARTMAN, M. S., *Superintendent*
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Madison Co. Experiment Farm, London
..... *Supt.*, London

Paulding Co. Experiment Farm, Paulding
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Belmont Co. Experiment Farm, St. Clairsville
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STATE FORESTS

Waterloo State Forest, New Marshfield
Dean State Forest, Steece

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[1]In cooperation with the College of Agriculture, Ohio State University, Columbus.
[2]In cooperation with the U. S. Department of Agriculture.

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Three brood mares and foals on Miami County Experiment Farm

A group of Duroc-Jersey pigs on the Miami County Experiment Farm

BULLETIN

OF THE

Ohio Agricultural Experiment Station

NUMBER 344 JUNE, 1920

COUNTY EXPERIMENT FARMS IN OHIO

PART I

THE MIAMI COUNTY EXPERIMENT FARM

EIGHTH AND NINTH ANNUAL REPORTS, FOR 1918 AND 1919

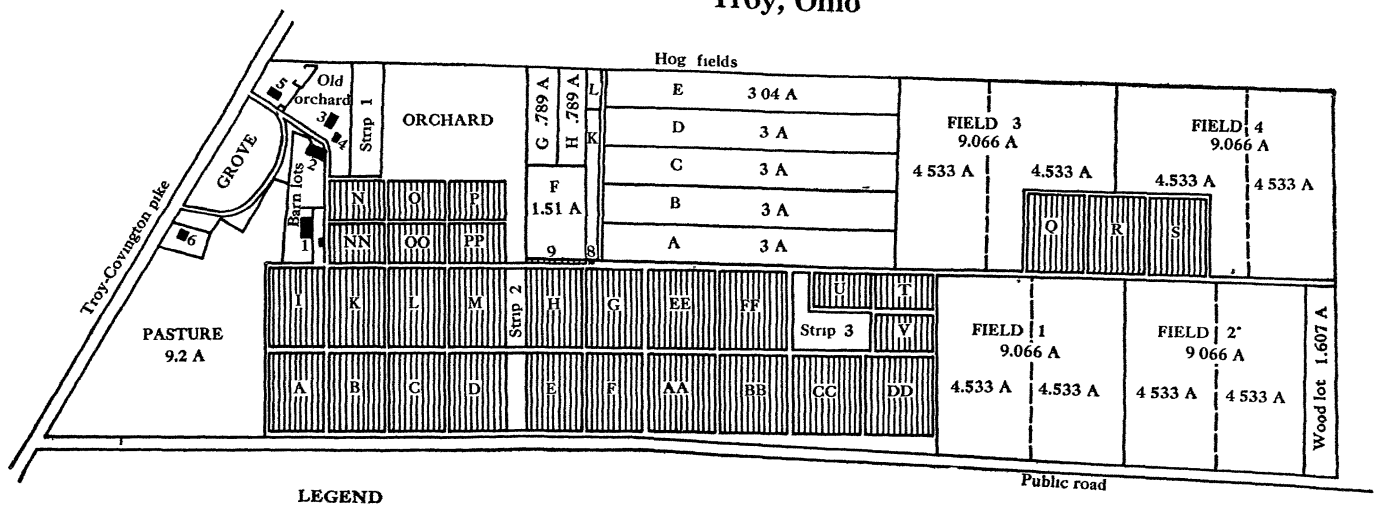
CHARLES E. THORNE, DIRECTOR

CARY W. MONTGOMERY, CHIEF OF DEPARTMENT

R. R. BARKER, SUPERINTENDENT
PERLE A. JONES, FOREMAN

MIAMI COUNTY EXPERIMENT FARM

Troy, Ohio



LEGEND

Blocks A, B, C, D, Fertility test, Rotation I
Blocks E, F, G, H, Fertility test, Rotation II
Blocks I, K, L, M, Fertility test, Rotation III
} Plots 1-10 acre

Block AA Alfalfa

Blocks CC, DD, EE, FF, Cereal variety test

Blocks N, O, P, Tobacco Rotation (IV) Fertility test
Blocks NN, OO, PP, Tobacco Rotation Variety test
Blocks T, U, V, Potato Rotation (VI) Fertility test
} Plots 1-20 acre

Blocks Q, R, S, Cereal 3-year rotation (V) Fertility test Plots 1-10 acre

Block BB, Rotation test

1-10 acre plots 272 1-4 ft. x 16 ft.
1-20 acre plots 136 1-8 ft. x 16 ft.
Paths 3 ft. wide
T, U, V, are 1-23 acre
118.36 ft. x 16 ft. 3 ft. paths
1 New barn, 2 Old barn, 3 Corn crib, 4 Tool shed, 5 Main house, 6 Tenant house.

Diagram I

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment March 1, 1919

Original costs: land and buildings		$18,505.00
*Permanent improvements previous to 1917		
Permanent improvements made 1917		146.70
Permanent improvements made 1918:		
Painting barn, hog feed house, 10 hog cotes, 3 hog shades and two closets	$178.50	
Installing hog watering system	203.54	
Two outside closets	78.53	
Tile drainage, 575 rods at 77.4 cents per rod	445.11	
		905.68
Total permanent investment exclusive of improvements made previous to 1917		$19,557.38
Operating equipment:		
Livestock: 6 horses, $1,525; 33 hogs, $825	$2,350.00	
Machinery, tools and harness	2,258.50	
Hog equipment, $468.35; orchard equipment, $18	486.35	
Crops, feeds, etc.: hay, $112; corn, $1,210; tankage, $32.40; wheat, $30.10; oats, $106; rye, $37; tobacco, $225	1,752.50	
Seeds: soybeans, $220.50; clover, 56.95; timothy, $32	309.45	
Office equipment	23.00	
Fertilizer	5.00	
Drain tile	90.00	
Gravel and cement	24.00	
Containers	19.95	
Sundries: gas and oil, $11; binder twine, $20; plot fixtures, etc., $52; wire fencing, $5	88.00	
		7,406.75
Total investments exclusive of improvements made previous to 1917		$26,964.13

*Data not available

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1919

Dr.

To Receipts

From County:		
Maintenance fund distribution		$ 995.28
From Farm Sales:		
Livestock: horses, $200; hogs, $1,896.55	$2,096.55	
Crops: corn, $61.34; oats, $18.40; soybeans, $111.50; potatoes, $23.13; tobacco, $210.15; wheat, $599.21; hay, $278.12; straw, $80.64; rye, $96.01; seeds and plants, $5; pasture, $5	1,488.50	
		3,561.05
Sundries: containers, $6; timber, $22.40; implement rent, $3.40; junk, $1.50		33.30
In hands of Superintendent for payment of small bills		25.00
To balance forward March 1, 1918		1,951.86
Total receipts		$6,590.49

Cr.

By Expenditures

For Labor	$1,613.65	
For Current Expenses: seeds, $87.13; feeds, $167.30; fertilizer, $330.10; spray material, $25.40; containers, $14.80; machine hire, $146.36; binding material, $53.60; livestock equipment, $9.75; fees, $40; veterinary service, $95; horse shoeing, $19.30; incidentals, $10.20; fence repair, $3.50; building maintenance, $27.41; drainage maintenance, 75 cents; water supply maintenance, $11.79; implement maintenance, $93.11; engine and tractor maintenance, $330.90; office supplies, 25 cents; transportation, $50.96; communication, $27.38; publicity, $20.90; fuel and light, $10.38; miscellaneous hardware, $6.20	1,582.47	
For Permanent Improvements: building material and construction, $249.58; concrete masonry, $30.50; water supply, $175.89; permanent planting (ornamental), $10.10	466.07	
For Machinery and Tools	22.73	
Total expenditures		$3,744.92
In hands of superintendent for payment of small bills		25.00
Balance in County Treasury February 28, 1919		2,820.57
		$6,590.49

CROP AND LABOR STATISTICS, 1918

Area of farm, 122.50 acres
Area in farmstead, 6.4 acres
Area cultivated, 84.16 acres
Orchard, 5 acres
Permanent pasture, 9.2 acres
Woodlot, 1.61 acres
Roads (public), 4 acres
Roads and alleys (farm) 12.13 acre

Crop	Number of plots	Total acreage	Total yield	Yield per acre
PLOT WORK		*Acres*	*Pounds*	
Corn	69	6.9	27,313	56.55 bu.
Oats	32	3.2	7,369	72. bu.
Soybeans	24	2.4	3,184	22.11 bu.
Potatoes	10	.43	1,485	56.92 bu.
Tobacco	20	1.	1,180	1,180 lb.
Wheat	87	6.6	7,273	18.33 bu.
Hay (timothy and clover)	60	5.86	17,455	1.49 tons
Hay (soybean)	1	.1	190	.95 tons
Hay (alfalfa, 3 cuttings)	12	1.43	10,935	3.83 tons
Total plots and plot acres	315	27.92		
FIELD WORK				
Corn (husked)		18.13	65,740	51.79 bu.
Corn (hogged off)		9.79	15,546 shelled	28.37 bu.
Oats		4.53	8,160	56.25 bu.
Soybeans		1.	1,144	19.07 bu.
Soybeans (orchard)		2.	840	
Wheat		4.53	4,580	16.84 bu.
Rye		3.	2,462	14.65 bu.
Hay (mixed)		10.16	44,800	2.2 tons
Hay cut from roads and pasture		10.8	22,300	
Pasture hogs		5.84		
Truck patch (family use)		.5		
Total field acres		70.28		
Total crop acres		98.20		
Less crop taken from roads, orchard and pastures		14.04		
Total cultivated area		84.16		

	Corn bu.	Oats bu.	Soybeans bu.	Potatoes bu.	Tobacco lb.	Wheat bu.	Hay	
							Mixed tons	Alfalfa tons
Highest yielding plots per acre	82.14	82.18	34.33	65.17	2,100	34.46	3.34	4.96
Lowest yielding plots per acre	30	56.25	17.5	46.38	660	2.	.51	3.31

Number of work horses used on Miami County Experiment Farm in 1918....4
Number crop acres per work horse....22.29
Number man hours per year (March 1, 1918, to February 28, 1919, inclusive)....7,489
Number horse hours per year (March 1, 1918, to February, 28, 1919, inclusive)....4,128
Number tractor hours per year (March 1, 1918, to February 28, 1919, inclusive)....411

FINANCIAL SUMMARY

Inventory of Permanent Investment Cost and Operating Equipment March 1, 1920

Original Costs: land and buildings		$18,505.00
*Permanent Improvements previous to 1917		
Permanent Improvements to March 1, 1919, and after 1917		1,052.38
Permanent Improvements made 1919:		
Material and labor for addition to new barn	$942.36	
Material, labor and paint for new tool shed	344.53	
Material and labor for foundation for new house	515.04	
Installing kitchen sink	10.65	
Dynamite and labor clearing land	25.72	
Plantings	4.96	
		1,843.26
Total permanent investment exclusive of improvements made previous to 1917		$21,400.64
Operating Equipment:		
Livestock: 5 horses and 3 colts, $1,605; hogs, $835	$2,440.00	
Machinery, tools and harness	1,870.75	
Crops and feeds: corn, $615; oats, $39; wheat, $225; hay, $150; straw, $30; stover, $30; tobacco, $300; mill feed, $20	1,409.00	
Seeds: timothy	15.00	
Containers	8.75	
Drain tile	40.00	
Foundation for new house	619.57	
Hog equipment	411.00	
Office equipment	20.25	
Sundries: plot stakes, $33; spray material, $4; gasoline, $22.95; wire, $2	61.95	
		6,896.27
Total investment of improvements made previous to 1917		$28,288.69

*Data not obtainable.

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1920

Dr.

To Receipts

From County		$1,610.97
From Farm Sales:		
Livestock: hogs, $2,172.92; horse, $150	$2,322.92	
Crops: corn, $291.97; oats, $131.47; wheat, $558.84; rye, $25.50; hay, $292.37; soybeans, $186.09	1,486.24	
Sundries: use of implements, $1.20; spray material, $2.10; old sacks, $8.35; junk, $6.88	18.53	
Total		3,827.69
Returned check		151.00
Refund Tractor Company		6.30
In hands of Superintendent for payment of small bills		25.00
To balance forward March 1, 1919		2,820.58
		$8,441.54

Cr.

By Expenditures

For Labor	$2,007.77	
For Current Expenses: seeds, $48.52; feeds, $252.51; livestock equipment, $16.20; horse shoeing, $22.10; veterinary, $84.70; fees, $73.50; livestock incidentals, 95 cents; building renewal and repair, $60.51; water supply repair, $2; implement repair, $117.15; engine maintenance, $246.40; fence repair, $7.20; fertilizer, $163.75; spray material, $39.98; containers, $11.05; plot fixtures, $7.16; transportation, $61.66; communication, $21.40; publicity, $12.80; miscellaneous hardware, $10.45; commission to Treasurer, $22.37	1,282.36	
For Permanent Improvements: building material, $1,734.61; concrete material, $77.97; ornamental planting, $4.96; dynamite for clearing land, $17.50	1,835.04	
For Machinery, Tools and Harness	168.83	
For Livestock: hogs	60.00	
Total expenditures		$5,354.00
In hands of Superintendent for the payment of small bills		25.00
Balance in County Treasury February 28, 1920		3,062.54
		$8,441.54

CROP AND LABOR STATISTICS, 1919

Area of farm, 122.50 acrss
Area of farmstead, 6.4 acres
Area cultivated, 86.29 acres
Orchard, 4 acres

Pasture, 9.2 acres
Woodlot, 1.61 acres
Public road, 4. acres
Farm road, 11. acres

Crop	Number of plots	Total acreage	Total yield	Yield per acre
PLOT WORK		*Acres*	*Pounds*	
Corn	69	6.9	27,965	57.89 bu.
Oats	30	3.	4,541.5	47.3 bu.
Soybeans*	24	2.4	364	2.52 bu.
Potatoes	10	.435	1,236	47.3 bu.
Tobacco	20	1.	1,400.5	1,400.5 lb.
Wheat	74	5.835	8,434	24.09 bu.
Wheat (spring)	1	.1	26	4.33 bu.
Barley	1	.1	161	33.54 bu.
Hay (clover and timothy)	70	6.4535	16,580	1.284 tons
Hay (alfalfa)	12	1.425	4,313	1.516 tons
Hay (soybean)	1	.1	580	2.9 tons
Total plots and plot acres	312	27.758		
FIELD WORK				
Corn (husked)		18.	54,585	43.32 bu.
Corn (hogged off)		9.	20,538	32.60 bu.
Oats		4.5	5,095	35.38 bu.
Wheat		10.25	16,294	24.14 bu.
Rye		3.	1,155	6.88 bu.
Barley		.79	470	12.39 bu.
Hay (clover)		6.5	26,565	2.04 tons
Hay (alfalfa)		.75	unharvested	
Pasture		5.5		
Total field acres		58.29		
Total crop acres				

						Hay
	Corn bu.	Oats bu.	Soybeans bu.	Potatoes bu.	Wheat bu.	Mixed alfalfa tons
Highest yielding plots per acre	79.71	58.75	1.98	55.58	36.	3.15
Lowest yielding plots per acre	29.28	32.5	.8	33.92	6.17	6.

Number of work horses 5
Number of crop acres per work horse 17.26
Number of man hours 7,481.5
Number of horse hours 3,179
Number of tractor hours 269.5

MIAMI COUNTY EXPERIMENT FARM ANNUAL REPORT FOR 1918

WORK OF THE YEAR 1918

R. R. BARKER

PERSONNEL

P. A. Jones held the position of foreman during the entire year and has been re-employed for the coming year.

PERMANENT IMPROVEMENTS

A hog-watering system for the purpose of supplying water to hogs in any of the hog fields was installed during May at a total cost of $203.54. The system consists of a 150-gallon supply tank in the feed house into which water is pumped by a gasoline engine. A water line extends from this tank past each hog field and a valve and a few feet of hose make it possible to fill a water barrel or a trough in each field.

Two outside closets were erected during the month of June for use particularly when public meetings are being held on the farm. The total cost amounted to $78.53.

Two coats of white lead and oil were given to the new barn, hog feed house and all cotes and shades during the fall. The total cost amounted to about $160.

Plans have been made for a new tool shed to be built as an addition to the west end of the barn. Some work has been done on the foundation but the carpenter work has not been started.

During the month of November about 575 rods of drain tile were installed. Of this amount 30 rods were 8-inch, 100 rods 6-inch and 455 rods were 4- and 3½-inch tile. The total cost amounted to $387 without counting the use of the State ditching machine and a man's time to operate it. There yet remains about 200 rods of tile on the farm to be installed, but when it is all in there should be more than as many rods more put in as soon as possible.

Some minor repairs have been made on both dwelling houses.

HOG WORK

Four old sows that did not seem desirable to be retained as part of the breeding herd were sold to the butcher during the latter part of October. Four gilts were selected from the spring litter of pigs to take their places. One gilt was sold to a neighbor for his breeding herd and several others were spoken for by other parties

but probably because cholera broke out in the herd they were not taken. One male hog was sold to the Hamilton County Experiment Farm early in the season.

Cholera broke out in the herd during the first part of November just a few days before the fat hogs were to be put on the market. The fat hogs were sold immediately and the remainder of the herd was immuned against the diesase. The result was that only two hogs took sick and only one died.

Nine and three-quarters acres of corn were hogged off during the season and while doing that some interesting tests were conducted. One lot of hogs was put in a field where soybeans grew with the corn and compared with another lot hogging down corn and being fed tankage. The gains made by the hogs on the soybeans were much smaller than those fed tankage. Another lot was hand-fed corn and tankage and compared with a lot hogging down corn and being fed tankage. There was very little difference in the gain made by these two lots.

The cost account kept with the hog work indicates that the spring litter of pigs made good money but that the fall litter possibly lost some money. We believe the management of the fall litter can be improved upon another year.

FINANCIAL SUMMARY OF THE HOG WORK FOR THE YEAR

March 1, 1918, to February 28, 1919

DEBITS		CREDITS	
First Inventory		Second Inventory	
Livestock	$ 675.00	Livestock	$ 825.00
6.25 A. land and equipment	1,343.00	6.25 A. land and equipment	1,529 00
Equipment purchased	204.59	Livestock sold	1,896.55
Feed fed	1,643.26	Two tons hay cut from hog pasture.	12.00
Man hours, 616 at 30c per hr.	184 80		
Horse hours, 69 at 15c per hr.	10.35		
Tractor hours, 8 at 50c per hr.	4.00		
Interest on average of investment	131.16		
Immuning hogs against cholera	70 00		
Commission for selling hogs	5.00		
		To balance (loss)	8.61
Total	$4,271.16		$4,271.16

HORSES

Three mares foaled in the spring of 1918 but not one of the colts was raised. One died before being able to stand, another died with tetanus after having its leg stepped on and broken by its dam, and the third one died as a result of being kicked by another horse while in the pasture. All three mares were bred again during the spring of 1919.

There are two 2-year-old colts on the farm now which will be broken for work this coming spring. One of them is a purebred

Percheron mare and the farm has been offered $300 for her. The other one is a well-built big bay colt and promises to make a splendid work animal.

One red roan horse was sold last spring for $200 when it was found that the tractor would do a good share of our work.

EQUIPMENT

Very little machinery or tools have been purchased during the past year, a double-disk harrow being the only large item.

EXPERIMENTAL WORK

No new experimental work was started during the year but all the regular work was carried out very faithfully according to plan. There were no crop failures and the plot work showed very well.

The fertility work in the orchard showed up well during the past season, the trees on the cover crop section having a darker green foliage than those on the sod-mulch section. Some of the trees bore a few apples last season.

PUBLICITY

The attendance at the annual field meeting last year was less than it had been some years before, although the speaking program was excellent, and the visitors at the farm during the summer season were fewer also. We are planning with the county agent to invite members of the Farm Bureau to visit the farm next summer in small groups. We would like also to have a few special meetings, as a tobacco meeting, a horticultural meeting, and a hog meeting, besides our annual field day. We have begun the practice of writing an article about the farm for the local papers once a month.

WORK OF THE YEAR 1919

R. R. BARKER

PERSONNEL

P. A. Jones held the position of foreman during the entire year and has been re-employed for the coming year. Mr. Jones is now entering on his seventh year as foreman of this farm.

EXPERIMENTAL PLOT WORK

No new field work has been started during the past year. There are now on the farm a total of 315 experimental plots, 90 one-twentieth acre plots and 225 one-tenth acre plots. The crops

on all the plots have been properly cared for and harvested and the results recorded with the exception of the soybeans, which were lost after harvesting and before they were ready to thresh, due to the very wet weather during October.

FIELD WORK

Eighteen acres of corn was raised and harvested by hand that made an average yield of about 56 bushels per acre. Nine acres of wheat yielded about 27 bushels per acre. Four and one-half acres of oats yielded about 35 bushels per acre. Four and one-half acres of hay was also harvested that was intended to be clover lightly mixed with timothy, but because red clover in Miami County has been so badly attacked with an insect during the past 2 years, timothy predominated in the hay crop. The red clover crop on the fields and plots as well was practically a failure last year due to the insects and the hay was largely timothy.

During the war a change was made in the field rotation in order to get more acreage of wheat. Clover was sown in the oats and instead of allowing it to stand for a hay crop the following season it was plowed down during August for wheat. The plan for growing more wheat has worked well for 2 years and the wheat has been more profitable than the hay crop.

When corn follows corn in the fields the yield is reduced materially, about 6 to 8 bushels per acre. It seems that a rotation should be arranged whereby that would be avoided.

HOG WORK

The usual amount of experimental feeding of hogs has been done during the past year. A test of hogging off and hand feeding rye was conducted, the results of which seemed to show that better gains would be made by hand feeding. The gains obtained from hogging off the rye were large enough to be profitable, however, and when we consider the large amount of labor saved we find the practice may be well worth some attention. A comparison of hogging off corn with and without clover pasture was also tried, some tankage being fed in each case. Another comparison of hogging off corn and hand feeding corn was made, but the weather at the time this test was made was very unfavorable for hogging off corn; it rained a large part of the time, making the field very muddy.

Another winter feeding test is being conducted in which soybean meal is being substituted for a part of the tankage in a ration of corn and tankage.

A breeding herd of ten registered Duroc-Jersey sows and one male hog are kept. All sows are bred to farrow in the spring and five or six to farrow in the fall. Cost accounts of the hog work as a single project have been kept for the past 2 years. The following is a financial summary of the work for the year beginning March 1, 1919, and ending February 29, 1920.

DEBITS		CREDITS	
First Inventory		Second Inventory	
6.25 A. land and equipment	$1,529.00	6.25 A. land and equipment	$1,475.25
Livestock	825.00	Livestock	835.00
Livestock purchased	60.00	Livestock sold	2,282.09
Feed fed	2,094.91	Two hogs butchered	70.00
Man hours, 728 at 36½c per hr.	265.72		
Horse hours, 68 at 15c per hr.	10.20		
Interest on average of inventories at 6 percent	139.93		
Immuning hogs against cholera	52.20		
Registration fees	10.00	To balance (loss)	324.62
Total	$4,986.96	Total	4,986.96

These figures show quite clearly the result of the sharp break in the hog market last fall.

There are 15 acres of land divided into five fields of 3 acres each that are devoted to growing crops for hogging off. One field grows corn continuously and the remaining four are in a rotation of corn, corn, rye and clover. The yield of corn in the fields hogged off is computed by husking two rows, weighing, and then counting the rows of corn in the field. The yields are all reduced to a basis of 15 percent moisture content. This rotation, together with the field which grows corn continuously, make a nice lot of corn to be hogged off each fall, and it is interesting to note the effect this system of management is having on the yield of the crops.

Averaging the yield of 5 consecutive years, corn following clover in the rotation has surpassed corn following corn in yield by about 8 bushels per acre, but the yield of the continuous corn has been a little larger than that of the corn that followed corn in rotation.

It is not safe to go too far with conclusions in regard to these yields, however, since there seem to be other factors that affect the yields besides the rotation and the soil. One of these factors was strikingly illustrated last season by the corn in the continuous corn field. When hogging off the three fields it is the usual practice to turn into one at a time, so there is difference in the time of harvesting. One had no difficulty in picking the continuous culture corn field as the poorest of the three fields of corn all through the growing season. As it happened, that field was the last one hogged off and when all yields were reduced to a basis of 15 percent mois-

ture content the yield exceeded both the other fields. It seems that the poorer looking corn thoroughly matured had more dry weight than the better looking corn not so mature.

ORCHARD WORK

About 5 acres of thrifty young apple trees, the most of which are 7 years old, is being cared for under the direction of the Horticultural Department. About 3 acres is devoted to a variety test and the remaining 2 acres to a fertility test where fertilizers are being tried on both a sod-mulch section and a clean-culture section.

PERMANENT IMPROVEMENTS

An addition to the barn, 30 by 80 feet, for storage of farm tools, was erected during the past year at a total cost of $1,313, including about $38 farm labor. It joins the main barn and covers the manure pit and has a loft over all excepting two main drives. It has been planned to have bins for small grain built in one end of this barn, but that has not yet been done.

The excavating and foundation for a new six-room dwelling house has been completed during the past fall, but because of some legal difficulties the completion of the house had to be postponed.

DISTRIBUTION OF SEEDS

About 50 bushels of soybeans were sold for seed last spring, a large share of them going to farmers in the county. Some seed corn and oats were also sold.

Nine acres of Gladden wheat was raised with the purpose of putting it all out for seed if it was called for. By cooperating with the County Agricultural Agent arrangements were made whereby two or three farmers in each township would get a few bushels of seed with the understanding that they were to save clean pure seed from it next year. In that way the wheat was all engaged for seed before it was cut. After threshing it was carefully cleaned and only the cleaned wheat put out for seed.

PUBLICITY

Due to the splendid cooperation of the County Agricultural Agent and the Farm Bureau during the past year it was possible to have as many as five separate township farm bureau meetings on the farm. The average attendance of men at those meetings was about fifteen, and every man seemed keenly interested.

The annual wheatfield day was held the latter part of June as usual and was attended by from two hundred to three hundred people. The day following wheatfield day a delegation of about fifty farmers from Champaign County visited the farm, had a picnic dinner, and made a tour of thorough inspection. A group of corn growers from Auglaize County visited the farm during August, and numerous other visitors, either singly or by twos and threes, visited the farm at various times during the summer.

THE MAINTENANCE OF SOIL FERTILITY

DEPARTMENT OF SOILS

Six rotations are in progress on the Miami County Experiment Farm; namely:

Rotation I: Corn, oats, wheat, clover.
Rotation II: Corn, soybeans, wheat, clover.
Rotation III: Corn, corn, oats, clover.
Rotation IV: Tobacco, wheat, clover.
Rotation V: Corn, wheat, clover.
Rotation VI: Potatoes, wheat, clover.

Rotations I, II and III were begun in 1911; Rotation IV was started in 1912, Rotation V in 1915, and Rotation VI in 1916. All these rotations are so arranged that each crop is grown every season. The plan of fertilizing is shown in Table 2.

THE 4-YEAR CEREAL ROTATIONS

The soil of the Miami County Experiment Farm is typical of very large areas of land in western Ohio having a nearly flat topography, the soil of the slight elevations being a yellow clay loam, while the depressions between are black. When cultivated without attention to fertility maintenance the yellow land loses a considerable part of its already deficient humus and becomes still lighter in color, while in the black land the losses due to cultivation are partially compensated by reinforcements from material washed in from the higher land. The consequence is that the yellow land shows fertility exhaustion much sooner than the black. The chemical analysis of the two types of soil is shown in Table 1.

These analyses indicate that the light-colored soil is low in phosphorus and that both soils are well supplied with calcium and magnesium. A test for carbonates, however, shows a deficiency in the light soil in this respect, amounting in some cases to actual acidity.

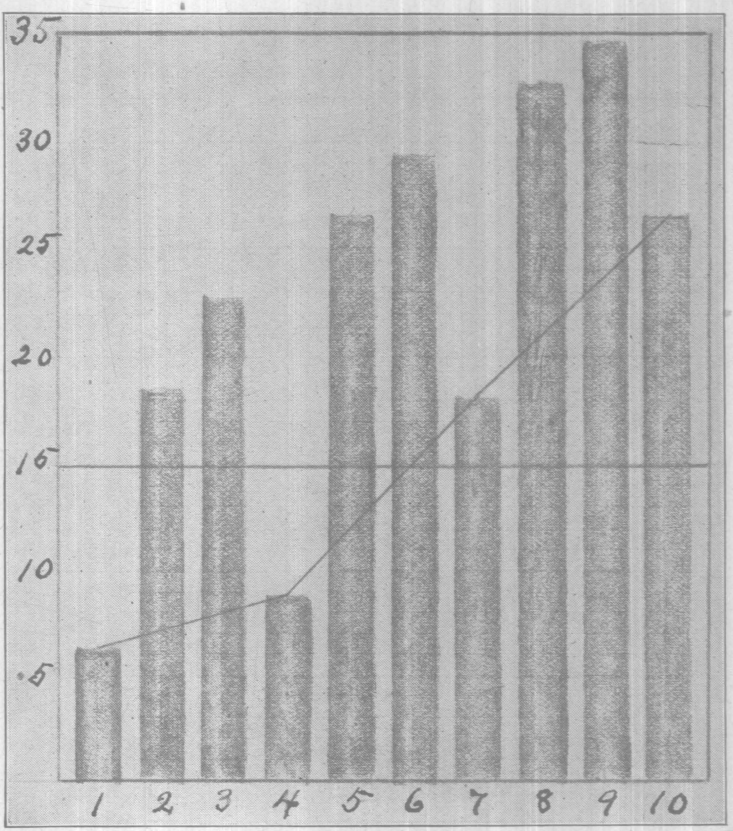


DIAGRAM II.—Methods of calculating increase

TABLE 1.—CHEMICAL ANALYSIS OF LIGHT AND DARK SOIL, MIAMI COUNTY EXPERIMENT FARM

Computed in pounds per acre

Color	Depth Inches	Nitrogen	Phosphorus	Potassium	Calcium	Magnesium
			Total			
Light	0-6	2,510	670	29,992	8,620	5,326
	6-12	1,200	416	33,116	7,318	7,970
Dark	0-6	6,060	2,186	34,500	19,232	12,818
	6-12	4,870	1,934	34,620	22,110	15,674
			Soluble in dilute nitric acid			
Light	0-6		42	336	2,144	386
	6-12		12	250	1,944	716
Dark	0-6		230	528	10,860	664
	6-12		142	502	13,340	962

On this farm it was difficult to find either type of soil in a sufficiently large area to contain the 40 plots of an experiment. Moreover, the great majority of farms contain both kinds of soil, hence the experiment was laid out as shown in the diagram on page 240, which roughly indicates the areas of light and dark soil.

By using long, narrow plots, and leaving every third plot continuously unfertilized as a check plot, it was hoped that results might be obtained that would be sufficiently correct to be useful.

In the calculation of increase by means of this system of check plots it is assumed that changes in fertility are likely to be progressive; that is, that if plots 1 and 4 yield 30 and 33 bushels, respectively, Plots 2 and 3, if left untreated, would probably have yielded 31 and 32 bushels. The outcome of this system of computation is illustrated by Diagram II, which shows the relative yields of wheat in 1919 on Block D, the unfertilized yields of which, on Plots 1, 4, 7 and 10, were 6.17, 8.75, 18 and 26.58 bushels, respectively. The diagram shows that if only one check plot had been left the experiment would have been worthless; that this would be the case if a simple average of all the check plots were taken, or the average of any two of them; but that by the system employed a very consistent outcome is attained, and the test would seem to be as reliable as though the soil had been uniform, and even more useful, because it applies more directly to conditions on the average Miami County farm.

Table 2 shows the plan of fertilizing in these experiments. The yields are shown in tables following.

TABLE 2.—PLAN OF FERTILIZING, MIAMI COUNTY EXPERIMENT FARM

Pounds of fertilizing materials per acre for each crop

Rotation I: Corn-oats-wheat-clover

Plot	On corn				On oats			On wheat		
	Acid phosphate	Muriate potash	Nitrate soda	Powdered limestone	Acid phosphate	Muriate potash	Nitrate soda	Acid phosphate	Muriate potash	Nitrate soda
1										
2	200				100			200		
3	200	50			100	20		200	20	
4										
5	200	50	50		100	20	30	200	20	80
6	200	50	50	*4,000	100	20	30	200	20	80
7										
8	Manure, 8 tons							200	50	50
9	Manure, 8 tons, phosphated†							200	50	50
10										

Rotation II: Corn-soybeans-wheat-clover

	On corn				On soybeans			On wheat		
1										
2	200				100			200		
3	200	50			100	20		200	20	
4										
5	200	50	50		100	20	30	200	20	80
6	130	50	50		70	20	10	160	20	20
7										
8	160	20	20		100			170		30
9	160	20	20	‡	100			170		30
10										

Rotation III: Corn-corn-oats-clover

	On corn 1st				On corn 2nd			On oats		
1										
2	200				200			100		
3	200	50			200	20		100	20	
4										
5	200	50	50		200	20	80	100	20	30
6	200	50	50	*4,000	200	20	80	100	20	30
7										
8	Manure, 8 tons				200	50	50			
9	Manure, 8 tons phosphated†				200	50	50			
10										

Rotation IV: Tobacco-wheat-clover

	Fertilizer all on tobacco			
1				
2	480			
3	480	180		
4				
5	480	180	240	
6	480	180	240	2,000
7				
8	240	90	120	
9	Manure, 10 tons, phosphated†			
10				

Rotation V:

	On corn			On wheat		
1						
2	200			200		
3	200	50		200	20	
4						
5	200	50	50	200	20	80
6	200	50	§50	200	20	80
7						
8	Manure, 8 tons			200	50	50
9	Manure, 8 tons, phos.†			200	50	50
10						

*2,000 pounds in 1912. †40 pounds acid phosphate per ton of manure. ‡Catch crop to follow corn. §4,000 pounds of limestone added.

TABLE 3, PART I.—Fertilizers and manure on CORN, Miami County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on corn	1918				1919				9-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	
	Rotation I: Corn-oats-wheat-clover	Block A				Block B								
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	42.86	1,650	.....	.....	30.71	1,600	.....	.....	41.75	2,143	.....	.....	1
2	Acid phosphate, 200 lb.	55.00	1,900	8.57	217	56.43	2,350	18.34	550	56.23	2,562	12.85	381	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb.	66.43	2,200	16.13	483	70.00	2,700	24.52	700	60.81	2,814	15.80	594	3
4	None	53.57	1,750	.....	.....	52.86	2,200	.....	.....	46.63	2,258	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	67.86	2,350	10.72	367	62.14	2,600	16.42	583	58.08	2,674	11.63	396	5
6	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb. powdered limestone, 2 tons	69.29	2,550	8.57	333	57.86	2,500	19.29	667	58.00	2,753	11.75	456	6
7	None	64.29	2,450	.....	.....	31.43	1,650	.....	.....	46.07	2,316	.....	.....	7
8	Untreated manure, 8 tons	82.14	3,400	16.42	867	62.86	2,450	25.24	617	62.81	2,893	14.10	454	8
9	Phosphated manure, 8 tons*	78.57	3,750	11.43	1,133	70.71	3,000	26.90	983	68.86	3,406	17.52	841	9
10	None	68.57	2,700	.....	.....	50.00	2,200	.....	.....	53.98	2,688	.....	.....	10
	Average unfertilized yield	57.33	2,137	.....	.....	41.25	1,912	.....	.....	47.11	2,774	.....	.....	
	Rotation II: Corn-soybeans-wheat-clover	Block F				Block G								
1	None	46.43	1,650	.....	.....	52.24	2,450	.....	.....	59.89	2,664	.....	.....	1
2	Acid phosphate, 200 lb.	61.43	2,200	11.91	450	66.43	3,150	10.00	533	66.09	2,917	7.23	267	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb.	70.00	2,350	17.38	500	72.14	3,050	11.43	267	68.79	3,009	10.96	373	3
4	None	55.71	1,950	.....	.....	65.00	2,950	.....	.....	56.80	2,622	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	65.71	2,150	12.86	233	74.29	3,250	7.86	300	63.10	2,887	7.39	303	5
6	Acid phos., 130 lb.; mur. pot., 50 lb.; nitrate soda, 20 lb.	63.57	2,150	13.57	267	77.14	2,750	9.28	−200	62.02	2,729	7.39	182	6
7	None	47.14	1,850	.....	.....	69.29	2,950	.....	.....	53.54	2,510	.....	.....	7
8	Acid phos. 160 lb.; mur. pot., 20 lb.; nitrate soda, 20 lb.	62.14	2,200	11.43	250	75.00	3,250	9.52	450	61.80	2,782	9.03	302	8
9	Acid phos., 160 lb.; mur. pot., 20 lb.; nitrate soda, 20 lb.	60.71	2,000	6.42	−50	70.71	3,350	9.04	700	59.13	2,762	7.11	313	9
10	None	57.86	2,150	.....	.....	57.86	2,500	.....	.....	51.25	2,419	.....	.....	10
	Average unfertilized yield	51.78	1,900	.....	.....	61.07	2,712	.....	.....	55.37	2,554	.....	.....	

*40 pounds acid phosphate per ton of manure.

TABLE 3, PART II.—Fertilizers and manure on CORN, Miami County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on corn	1918				1919				9-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	
	Rotation III: Corn-corn-oats-clover	Block K				Block L								
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	63.57	2,900	.....	.....	30.71	1,700	.....	.....	40.81	2,107	.....	.....	1
2	Acid phosphate, 200 lb	70.71	3,300	8.81	417	51.43	2,700	12.86	767	52.90	2,562	10.12	370	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb	70.71	3,500	10.47	633	62.86	2,750	16.43	583	57.62	2,727	12.88	448	3
4	None	58.57	2,850	.....	.....	54.29	2,400	.....	.....	46.70	2,364	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	60.71	2,950	8.33	350	67.86	2,900	16.19	633	58.01	2,677	12.68	346	5
6	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.; powdered limestone, 2 tons	57.14	2,550	10.95	200	72.14	2,750	23.09	617	59.24	2,614	15.28	316	6
7	None	40.00	2,100	.....	.....	46.43	2,000	.....	.....	42.58	2,266	.....	.....	7
8	Untreated manure, 8 tons	62.14	2,500	25.47	633	64.29	2,400	21.19	450	63.98	2,896	20.13	639	8
9	Phosphated manure, 8 tons	60.71	2,400	27.38	767	67.86	2,550	28.10	650	65.67	2,953	20.57	705	9
10	None	30.00	1,400	.....	.....	36.43	1,850	.....	.....	46.36	2,239	.....	.....	10
	Average unfertilized yield	48.03	2,312	.....	.....	41.96	1,987	.....	.....	44.11	2,244	.....	.....	
	Rotation III: Corn-corn-oats-clover: Corn second crop	Block I				Block K								
1	None	36.43	1,500	.....	.....	35.71	1,850	.....	.....	31.37	1,778	.....	.....	1
2	Acid phosphate, 200 lb	43.57	1,750	5.71	250	47.14	2,350	5.95	350	45.94	2,214	11.17	336	2
3	Acid phosphate, 200 lb.; muriate potash, 20 lb	53.57	1,750	14.29	250	55.71	2,450	9.05	300	52.82	2,405	14.64	425	3
4	None	40.71	1,500	.....	.....	52.14	2,300	.....	.....	41.57	2,081	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 20 lb.; nitrate soda, 80 lb.	60.00	2,100	17.15	467	57.86	2,200	9.29	67	54.91	2,492	13.80	409	5
6	Acid phos., 200 lb.; mur. pot., 20 lb.; nitate soda, 80 lb.	64.29	2,250	19.29	483	60.00	2,550	15.00	583	54.67	2,595	14.02	510	6
7	None	47.14	1,900	.....	.....	41.43	1,800	.....	.....	40.19	2,087	.....	.....	7
8	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	74.29	2,900	21.67	683	57.14	2,350	19.76	683	59.98	2,885	19.44	721	8
9	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	76.43	3,450	18.34	917	55.00	2,300	21.66	767	60.66	2,974	19.76	734	9
10	None	63.57	2,850	.....	.....	29.29	1,400	.....	.....	41.25	2,318	.....	.....	10
	Average unfertilized yield	46.96	1,937	.....	.....	39.64	1,837	.....	.....	38.60	2,966	.....	.....	

TABLE 4.—Fertilizers and manure on OATS, Miami County Experiment Farm. Yield and increase per acre

Plot No.	Treatment per acre on oats	1918 Yield		1918 Increase		1919 Yield		1919 Increase		Average Yield		Average Increase		Plot No.
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
	Rotation I: Corn-oats-wheat-clover	Block D				Block A				8-year average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	56.25	1,850	.....	.....	37.07	1,465	.....	.....	43.95	2,485	.....	.....	1
2	Acid phosphate, 100 lb	73.75	2,540	15.94	557	46.25	2,320	8.10	757	53.37	2,842	7.49	359	2
3	Acid phosphate, 100 lb.; muriate potash, 20 lb	72.81	2,970	13.43	853	50.62	2,330	11.39	668	57.99	3,041	10.17	559	3
4	None	60 94	2,250	.....	.....	40.31	1,760	.....	.....	49.74	2,480	.....	.....	4
5	Acid phos., 100 lb.; mur. pot., 20 lb.; nit. soda, 30 lb.	80.62	3,320	17.08	920	50.62	2,280	8.90	365	60.44	2,826	10.92	355	5
6	Acid phos., 100 lb.; mur. pot., 20 lb.; nit. soda, 30 lb.*	81.25	3,100	15.10	550	48.44	2,500	5.32	430	60.47	2,946	11.16	485	6
7	None	68.75	2,700	.....	.....	44.53	2,225	.....	.....	49.08	2,451	.....	.....	7
8	Untreated manure on corn	78.75	3,230	7.92	513	47.97	2,715	4.59	570	53.81	2,784	6.57	349	8
9	Phosphated manure on corn	80.94	4,260	8.02	1,527	47.03	2,945	4.79	880	55.66	3,197	7.96	742	9
10	None	75.00	2,750	.....	.....	41.09	1,985	.....	.....	48.16	2,474	.....	.....	10
	Average unfertilized yield	65.23	2 387	.....	.....	40.75	1,859	.....	.....	48.65	2,507	.....	.....	
	Rotation III: Corn-corn-oats-clover	Block M				Block I				8 year-average				
1	None	60.00	1,880	.....	.....	45.78	1,585	.....	.....	46.62	2,127	.....	.....	1
2	Acid phosphate, 100 lb	82.19	3,070	21.15	1,057	54.37	2,260	8.80	618	57.89	2,662	9.55	325	2
3	Acid phosphate, 100 lb.; muriate potash, 20 lb	80.03	3,180	17.95	1,033	53.91	2,225	8.54	527	61.54	3,054	11.47	506	3
4	None	63.12	2,280	.....	.....	45.16	1,755	.....	.....	51.79	2,758	.....	.....	4
5	Acid phos., 100 lb.; mur. potash, 20 lb.; nit. soda, 30 lb.	77.81	3,110	10.94	600	56.56	2,690	11.25	823	61.35	3,062	9.75	385	5
6	Acid phos., 100 lb.; mur. potash, 20 lb.; nit. soda, 30 lb.*	81.25	3,600	10.63	860	53.91	2,725	8.44	747	60.86	3,111	9.45	515	6
7	None	74.37	2,970	.....	.....	45.62	2,090	.....	.....	51.21	2,514	.....	.....	7
8	Untreated manure on corn	81.25	3,400	8.86	483	50.94	2,770	7.25	652	57.14	3,090	7.79	618	8
9	Phosphated manure on corn	76.87	3,590	6.45	727	49.06	2,930	7.29	783	57.75	3,283	8.63	812	9
10	None	68.44	2,810	.....	.....	39.84	2,175	.....	.....	48.89	2,457	.....	.....	10
	Average unfertilized yield	66.48	2,485	.....	.....	44.10	1,901	.....	.....	50.20	2,493	.....	.....	

*Powdered limestone on corn.

TABLE 5.—Fertilizers and manure on SOYBEANS, Miami County County Experiment Farm. Yield and increase per acre

Plot No.	Treatment per acre on soybeans	1918				Average				Plot No.
		Yield		Increase		Yield		Increase		
		Beans	Straw	Beans	Straw	Beans	Straw	Beans	Straw	
	Rotation II: Corn-soybeans-wheat-clover	Block E				7-year average*				
		Bu	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	24.67	2,685	.....	.....	23.89	2,482	.....	.....	1
2	Acid phosphate, 100 lb	27.50	2,950	2.55	370	25.43	2,813	2.07	455	2
3	Acid phosphate, 100 lb.; muriate potash, 20 lb	33.33	2,730	8.11	255	25.65	2,617	2.84	384	3
4	None	25.50	2,370	.....	.....	22.27	2,109	.....	.....	4
5	Acid phos., 100 lb.; mur. potash, 20 lb.; nitrate soda, 30 lb	26.33	2,670	1.55	357	23.45	2,534	1.88	495	5
6	Acid phos., 70 lb.; mnr. potash, 20 lb.; nitrate soda, 10 lb	26.33	2,620	2.28	363	21.53	2,122	.66	153	6
7	None	23.33	2,200	.....	.....	20.18	1,899	.....	.....	7
8	Acid phosphate, 100 lb	25.17	2,140	3.78	257	22.32	2,058	2.71	273	8
9	Acid phosphate, 100 lb	22.50	2,000	3.06	433	20.91	2,031	1.85	360	9
10	None	17.50	1,250	.....	.....	18.49	1,557	.....	.....	10
		22.75	2,126	.....	.....	21.21	2,011	.....	.....	

*The crop of 1919 was lost because continuous rain prevented threshing until the beans had rotted.

TABLE 6.—Fertilizers and manure on WHEAT, following oats or soybeans, Miami County Experiment Farm. Yield and increase per acre

Plot No.	Treatment per acre on wheat	1918				1919				Average				Plot No.
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
	Rotation I: Corn-oats-wheat-clover	Block C				Block D				7-year average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	9.07	1,556	.....	.....	6.17	1,280	.....	.....	12.69	1,664	.....	.....	1
2	Acid phosphate, 200 lb	23.67	2,480	16.12	1,233	18.50	2,740	11.47	1,362	24.79	2,670	12.93	1,131	2
3	Acid phosphate, 200 lb.; muriate of potash, 20 lb	27.27	2,764	21.25	1,825	22.83	2,980	14.94	1,503	26.28	2,702	15.25	1,286	3
4	None	4.50	630	.....	.....	8.75	1,575	.....	.....	10.20	1,291	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 20 lb.; nit. soda, 80 lb.	25.67	2,510	21.61	1,913	26.67	3,550	14.84	1,627	25.13	2,778	15.17	1,487	5
6	Acid phos., 200 lb.; mur. potash, 20 lb.; nit. soda, 80 lb.*	23.00	2,670	19.39	2,107	29.42	4,385	14.50	2,113	27.00	2,980	17.27	1,690	6
7	None	3.17	530	.....	.....	18.00	2,620	.....	.....	9.49	1,289	.....	.....	7
8	Acid phos., 200 lb.; mur. potash, 50 lb.; nit. soda, 50 lb.†	24 67	2,620	21.89	2,173	32.67	4,490	11.81	1,492	27.25	3,061	15.92	1,550	8
9	Acid phos., 200 lb.; mur. potash, 50 lb.; nit. soda, 50 lb.‡	23.67	2,730	21.28	2,367	34.67	4,870	10.95	1,493	28.25	3,219	15.09	1,485	9
10	None	2.00	280	.....	.....	26.58	3,755	.....	.....	15.00	1,957	.....	.....	10
	Average unfertilized yield	4.68	749	.....	.....	14.87	2,307	.....	.....	11.84	1,550	.....	.....	
	Rotation II: Corn-soybeans-wheat-clover	Block H				Block E				7-year average				
1	None	17.17	2,020	.....	.....	21.83	3,290	.....	.....	18.73	2,123	.....	.....	1
2	Acid phosphate, 200 lb	26.17	2,780	13.06	1,217	30.83	4,450	11.92	1,485	27.45	2,950	10.31	952	2
3	Acid phosphate, 200 lb.; muriate of potash, 20 lb	25.17	2,940	16.11	1,833	30.33	4,230	14.33	1,590	28.43	3,073	12.87	1,200	3
4	None	5.00	650	.....	.....	13.08	2,315	.....	.....	13.98	1,747	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 20 lb.; nit. soda, 80 lb.	21.67	2,450	16.45	1,697	25.08	3,495	12.59	1,293	28.19	3,142	14.68	1,404	5
6	Acid phos., 200 lb.; mur. potash, 20 lb.; nit. soda, 20 lb.	20.67	2,260	15.22	1,403	23.00	3,120	11.09	1,032	25.57	2,893	12.53	1,104	6
7	None	5.67	960	.....	.....	10.42	1,975	.....	.....	12.58	1,720	.....	.....	7
8	Acid phosphate, 170 lb.; nitrate soda, 30 lb.	18.00	1,920	12.44	953	22 17	3,470	12.25	1,598	24.51	2,701	12.40	1,064	8
9	Acid phosphate, 170 lb.; nitrate soda, 30 lb.§	17.83	2,030	12.39	1,057	22.33	3,160	12.91	1,392	24.37	2,571	12.74	1,017	9
10	None	5.33	980	.....	.....	8.92	1,665	.....	.....	11.17	1,472	.....	.....	10
	Average unfertilized yield	8.29	1 652	.....	.....	13.56	2,311	.....	.....	14.11	1,837	.....	.....	

*Powdered limestone on corn. †Untreated manure on corn. ‡Phosphated manure on corn. §Catch crop to follow corn.

TABLE 7.—Fertilizers and manure on CORN and WHEAT in corn-wheat-clover rotation, Miami County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918 Yield		1918 Increase		1919 Yield		1919 Increase		Average Yield		Average Increase		Plot
		Grain	Stover Straw	Grain	Stover Straw	Grain	Stover Straw†	Grain	Stover Straw†	Grain	Stover Straw	Grain	Stover Straw	
	Rotation V: Corn	Block Q				Block R				5-year average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	35.71	1,350	.....	.....	32.86	.....	.....	.....	42.67	1,970	.....	.....	1
2	Acid phosphate, 200 lb	32.14	1,450	—4.53	50	47.14	.....	6.90	.....	42.57	1,990	—1.54	8	2
3	Acid phosphote, 200 lb.; muriate potash, 50 lb	50.00	1,700	12.37	250	59 24	.....	11.67	.....	54.13	2,322	8.58	328	3
4	None	38.59	1,500	.....	.....	55 00	.....	.....	.....	46.99	2,005	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	50.00	1,650	10.23	117	61.43	.....	5.95	.....	52.93	2,185	5.86	136	5
6	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.; ground limestone, 2 tons	51.43	1,600	10.47	33	63.57	.....	7.62	.....	52.66	2,183	5.51	91	6
7	None	42.14	1,600	.....	.....	56.43	.....	.....	.....	47.23	2,137	.....	.....	7
8	Untreated manure, 8 tons	59.29	2,050	20.24	483	63.57	.....	9.76	.....	56.40	2,478	10.67	360	8
9	Phosphated manure, 8 tons*	61.43	2,050	25.48	517	61.43	.....	10.24	.....	58.51	2,652	14.29	552	9
10	None	32.86	1,500	.....	.....	48.57	.....	.....	.....	42.73	2,082	.....	.....	10
	Average unfertilized yield	37.32	1,487	.....	.....	48.21	.....	.....	.....	44.90	2,048	.....	.....	
	Rotation V: Wheat	Block S				Block Q				4-year average				
1	None	10.17	2,125	.....	.....	12.83	2,180	.....	.....	9.46	1,629	.....	.....	1
2	Acid phosphate, 200 lb	18.33	2,400	8.55	447	24.67	3,370	13.26	1,355	19.56	2,326	10.38	738	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb	21.00	2,140	11.61	358	29.83	4,060	19.83	2,210	25.18	2,801	16.28	1,253	3
4	None	9.00	1,610	.....	.....	8.58	1,685	.....	.....	8.62	1,507	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	24.67	2,970	15.45	1,357	31.00	4,340	21.89	2,603	27.27	3,151	17.85	1,535	5
6	Acid phos., 400 lb.; mur. pot., 100 lb.; nitrate soda, 100 lb.	24.67	2,820	15.22	1,203	30.58	4,165	20.94	2,377	27.44	3,054	17.23	1,329	6
7	None	9.67	1,620	.....	.....	10.17	1,840	.....	.....	11.00	1,834	.....	.....	7
8	Untreated manure, 8 tons	27.33	3,360	17 16	1,637	30.00	4,200	20.00	2,383	29.39	3,380	18.36	1,575	8
9	Phosphated manure, 8 tons*	27.33	3,310	16.66	1,483	35.17	4 840	25.33	3,047	31 50	3 610	20.44	1,834	9
10	None	11.17	1,930	.....	.....	9.67	1 770	.....	.....	11 08	1,747	.....	.....	10
	Average unfertilized yield	10.00	2,125	.....	.....	10.31	1 869	.....	.....	10.04	1.755	.....	.....	

*Acid phosphate, 40 pounds per ton of manure. †Stover mixed by storm.

TABLE 8.—Fertilizers and manure on TOBACCO and POTATOES grown in rotation with wheat and clover, Miami County Experiment Farm

Plot	Fertilizing materials per acre					Yield and increase per acre					
						1918		1919		Average	
	Acid phosphate	Muriate potash	Nitrate soda	Ground limestone	Manure	Yield	Increase	Yield	Increase	Yield	Increase
	Rotation II: Tobacco; pounds					Block N		Block O		8-year average	
1						1,040		800		1,075	
2	480					1,150	127	1,160	210	1,327	189
3	480	180				1,320	313	1,340	240	1,481	280
4						990		1,250		1,264	
5	480	180	240			1,490	610	1,350	213	1,522	352
6	480	180	240	1 ton		1,040	270	1,310	287	1,433	358
7						660		910		981	
8	240	80	120			1,130	467	1,030	247	1,192	257
9	400*				10 tons	1,200	533	1,010	353	1,215	326
10						670		530		843	
	Average unfertilized yield					840		872		1,042	
	Rotation VI: Potatoes; bushels					Block F		Block U		3-year average	
1						65.17		50.41		69.83	
2	200					61.33	—1.54	46.96	—1.85	55.77	—8.37
3	200	50				59.42	—1.15	37.95	—9.27	51.05	—7.41
4						58.27		45.62		52.77	
5	200	50	50			57.12	2.81	48.01	—.10	56.32	3.12
6	400	100	100			54.05	3.71	47.73	—2.87	52.97	—.65
7						46.38		53.09		54.05	
8					8 tons	58.65	10.10	55.58	8.88	64.40	9.61
9	320*				8 tons	55.93	5.20	54.82	14.51	63.05	7.51
10						52.90		33.92		56.28	
	Average unfertilized yield					55.68		45.76		58.23	

*Mixed with manure; "phosphated manure."

TABLE 9.—Fertilizers and manure on WHEAT following tobacco or potatoes, Miami County Experiment Farm

Plot	Fertilizers per acre on wheat*	1918 Yield Grain	1918 Yield Straw	1918 Increase Grain	1918 Increase Straw	1919 Yield Grain	1919 Yield Straw	1919 Increase Grain	1919 Increase Straw†	Average Yield Grain	Average Yield Straw	Average Increase Grain	Average Increase Straw	Plot
	Rotation IV: Tobacco-wheat-clover	Block P				Block N				7-year average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	7.33	2,960			26.67	2,700			23.44	2,985			1
2	Acid phosphate, 480 lb.*	14.33	2,540	7.55	247	34.67	3,500	5.22	533	31.74	3,135	6.17	153	2
3	Acid phosphpate, 480 lb.; muriate potash, 180 lb.*	18.67	2,680	12.45	1,053	33.67	3,400	1.47	167	33.97	3,400	6.28	626	3
4	None	5.67	960			35.00	3,500			29.82	2,976			4
5	Acid phos., 480 lb.; mur. pot. 180 lb.; nittrate soda, 240 lb.	18.00	2,220	12.22	1,133	38.67	3 900	5.39	567	35.29	3 698	7.56	822	5
6	Acid phos., 480 lb., mur. pot., 180 lb.; nitrate soda, 240 lb. ground limestone, 1 ton	16.67	2,200	10.78	987	33.00	3,300	1.45	133	33.89	3,483	8.25	709	6
7	None.†	6.00	1,340			29.83	3,000			23.55	8,674			7
8	Acid phos., 240 lb.; mur. pot., 90 lb.; nitrate soda, 120 lb.	9.00	960	.44	—593	35.00	3,500	7.00	700	25.69	2,439	2.24	—184	8
9	Acid phos., 400 lb.; stable manure, 10 tons	23.33	3,100	12.22	1,333	36.17	3,600	10.01	1,000	31.02	3,344	7.67	772	9
10	None	13.67	1 980			24.33	2,400			23.25	2,522			10
	Average unfertilized yield	8.17	1 810			28.96	2,900			25.02	2,789			
	Rotation VI: Potatoes-wheat-clover	Block V				Block T				4-year average				
1	None	9.58	2,070			18.97	3,116			22.23	2,863			1
2	Acid phosphate, 200 lb	16.10	2,944	8.44	1,027	24.92	3,565	6.84	395	29.47	3,594	9.01	777	2
3	Acid phosphate, 200 lb.; muriate potash, 20 lb	17.63	2,737	11.88	974	26.45	3,588	9.27	365	30.09	3,599	11.40	830	3
4	None	3.83	1,610			16.29	3,277			16.91	2,722			4
5	Acid phos., 200 lb.; mur. pot., 20 lb.; nitrate soda, 80 lb.	15.72	2,967	12.40	1,403	25.49	3,875	8.88	732	31.10	3,913	14.04	1,180	5
6	Acid phosphate, 200 lb.; muriate potash, 20 lb	14.18	2,369	11.37	851	26.64	3,576	9.71	567	31.10	3,841	13.90	1,097	6
7	None	2.30	1,472			17.25	2,875			17.34	2,754			7
8	Acid phosphate, 400 lb. (manure on potatoes)	13.03	2,323	9.71	1,027	27.79	3,737	10.54	709	31.24	3,846	14.39	1,168	8
9	Acid phosphate, 400 lb. (manure on potatoes)	13.03	2,323	8.68	1,204	27.98	4,071	10.73	889	29.42	3,956	13.06	1,353	9
10	None	5.37	943			17.25	3,335			15.86	2,527			10
	Average unfertilized yield	5.27	1,524			17.44	3,151			18.08	2,717			

*In the tobacco rotation the fertilizers are all applied to the tobacco. †The straw was wet when the wheat was threshed in 1919, hence the yields of straw for that year are estimated.

TABLE 10, PART I.—Residual effect on CLOVER of fertilizing materials applied to previous crops of rotation, Miami County Experiment Farm

Pounds per acre

Plot	Fertilizing materials on previous crop					Yield and increase					
						1918		1919		Average	
	Acid phosphate	Muriate potash	Nitrate soda	Ground limestone	Manure	Yield	Increase	Yield	Increase	Yield	Increase
Rotation I: Corn-oats-wheat-clover						Block B		Block C		6-year average	
1						2,442		2,863		3,138	
2	500					1,937	—309†	2,863	477	3,446	537
3	500	90				2,611	562	2,400	491	3,266	587
4						1,853		1,432		2,451	
5	500	90	160			2,021	266	2,105	936	3,006	572
6	500	90	160	2 tons		2,695	1,039	2,442	1,537	3,390	980
7						1,558		642		2,390	
8	200	50	50		8 tons	2,105	645	1,305	540	3,092	642
9	520*	50	50		8 tons	2,400	1,039	2,400	1,512	3,545	1,034
10						1,263		1,011		2,572	
Average unfertilized yield						1,779		1,487		2,638	
Rotation II: Corn-soybeans-wheat-clover						Block G		Block H		6-year average	
1						1,684		2,063		3,024	
2	500					3,200	1,235	2,358	365	3,794	773
3	500	90				3,158	913	2,232	309	3,726	708
4						2,526		1,853		3,014	
5	500	90	160			2,905	281	2,442	659	3,458	446
6	360	90	50			2,863	140	2,021	309	3,283	274
7						2,821		1,642		3,008	
8	430	20	50			2,863	365	2,484	688	3,480	464
9	430	20	50			3,074	898	2,947	996	3,679	654
10						1,853		2,105		3,033	
Average unfertilized yield						2,221		1,916		3,020	
Rotation III: Corn-corn-oats-clover						Block L		Block M			
1						1,389		926		2,146	
2	500					2,737	1,151	2,358	1,474	2,983	813
3	500	90				3,242	1,460	2,442	1,600	3,203	1,010
4						1,979		800		2,217	
5	500	90	160			2,316	491	2,526	1,249	2,909	693
6	500	90	160			3,326	1,656	2,611	856	3,231	1,016
7						1,516		2,232		2,214	
8	200	50	50		8 tons	2,400	1,052	3,074	800	3,276	1,001
9	520*	50	50		8 tons	3,032	1,853	2,947	631	3,591	1,254
10						1,011		2,358		2,398	
Average unfertilized yield						1,474		1,579		2,244	

*320 lb. in "phosphated" manure and 200 lb. on wheat. †Decrease.

TABLE 10, PART II.—Residual effect on CLOVER of fertilizing materials applied to previous crops of rotation, Miami County Experiment Farm

Pounds per acre

Plot	Fertilizing materials on previous crops					Yield and increase					
						1918		1919		Average	
	Acid phosphate	Muriate potash	Nitrate soda	Ground limestone	Manure	Yield	Increase	Yield	Increase	Yield	Increase
	Rotation IV: Tobacco-wheat-clover					Block O		Block P		6-year average	
1						2,779		4,379		4,898	
2	480					4,379	1,039	5,221	954	6,100	1,175
3	480	180				4,800	898	4,632	478	6,034	1,081
4						4,463		4,042		4,980	
5	480	180	240			5,139	704	4,547	814	5,615	765
6	480	180	240	1 ton		4,800	393	3,874	449	5,327	606
7						4,379		3,116		4,592	
8	240	90	120			4,295	—28	4,295	758	5,022	304
9	400				10 tons	5,053	786	5,305	1,347	5,647	803
10						4,211		4,379		4,970	
	Average unfertilized yield					3,958		3,979		4,860	
	Rotation V: Corn-wheat-clover					Block R		Block S		3-year average	
1						1,768		2,189		2,358	
2						3,116	1,039	1,979	—28	2,498	183
3						2,695	309	1,769	—55	2,499	225
4						2,695		1,642		2,232	
5						3,411	562	2,526	814	2,807	505
6						3,621	617	2,274	491	2,835	463
7						3,158		1,853		2,442	
8						3,579	561	2,526	406	2,975	528
9						4,168	1,291	2,737	351	3,256	804
10						2,737		2,653		2,458	
	Average unfertilized yield					2,589		2,084		2,372	
	Rotation VI: Potatoes-wheat-clover					Block U		Block V		3-year average	
1						3,874		2,875		3,638	
2	400					4,455	355	3,565	613	3,835	172
3	400	70				4,649	323	2,415	—613	3,388	—301
4						4,552		3,105		3,714	
5	400	70	130			6,585	1,517	2,990	115	4,225	426
6	600	120	100			6,101	516	2,990	345	4,322	438
7						6,101		2,415		3,969	
8					8 tons	6,682	1,001	3,220	920	4,656	812
9	720*				8 tons	5,327	65	3,450	1,265	4,217	497
10						4,842		2,070		3,595	
	Average unfertilized yield					4,842		2,616		3,729	

* 320 pounds mixed with manure, "phosphated manure."

Fertilizers and manure on corn.—Table 3 shows that in the 9-year average acid phosphate has produced a decided increase in yield, averaging, in the 4 crops, more than 10 bushels of corn for 200 pounds of phosphate. Even at the lowest increase of 7 bushels the phosphate has returned a very large profit in the corn crop alone.

The addition to the phosphate of 50 pounds of muriate of potash has added a little more than 3 bushels to the yield. At normal prices for the potash salt this would also be a profitable increase, but with muriate of potash at $150 a ton corn must sell at more than a dollar a bushel to break even.

The further addition of nitrogen, in nitrate of soda, has not increased the yield over that produced by acid phosphate and muriate of potash combined, showing that the clover is thus far meeting the demands for nitrogen of the corn crops following.

The addition of ground limestone has added less than a bushel of corn to the yield produced by the same fertilizing without the limestone.

The manured land receives much larger quantities of the fertilizing elements than are given to any of the fertilized plots, and its yield is larger, though not proportionately so. The addition of acid phosphate to the manure has not as yet added enough to the increase to pay for the phosphate in these rotations, in which one of the other crops also receives acid phosphate.

Fertilizers and manure on oats.—In planning the fertilizing, the oats crop was given about half the quantities of fertilizers given to the corn, and no manure, the expectation being that the oats would profit by the residual effect of the treatment on the corn. The average increase of oats from acid phosphate has been 8½ bushels per acre, which is 18 percent of the unfertilized yield, while the increase of corn has been 22 percent of the unfertilized yield. The addition to the acid phosphate of 20 pounds of muriate of potash has raised the average yield by 2⅓ bushels, which would about cover the cost of the potash.

The further additions of nitrogen and limestone have not increased the yield.

The residual effect on oats of manure and fertilizers applied to previous crops is shown to be of considerable importance.

Fertilizers and manure on soybeans.—The soybean crop of 1919 was lost because of continuous rains at time of harvesting.

The unfertilized yield of soybeans for the 7 crops harvested in this experiment has averaged 21 bushels per acre, as against 55 bushels or less for corn and oats and 12 to 14 bushels for wheat,

thus making the soybean a relatively profitable crop at $3 a bushel. Soybeans have been selling for seed of late at more than twice this price.

Soybeans show a relatively smaller increase from fertilizers than the cereal crops, but the response to acid phosphate has been profitable.

Fertilizers and manure on wheat.—Wheat has followed oats, soybeans and tobacco, each for 7 years, and corn and potatoes each for 4 years. In Table 11 is given the actual total yields obtained and the calculated increase from the different treatments in these different rotations.

TABLE 11.—Effect of previous crop in rotation on wheat.
Miami County Experiment Farm
Average yield and increase per acre

Crop preceding wheat in rotation	No treatment	Acid phosphate	Acid phosphate Muriate potash	Acid phosphate Muriate potash Nitrate soda
	Bu.	Bu.	Bu.	Bu.
Total yield				
Corn	10.04	19.56	25.18	27.27
Oats	11.84	24.79	26.28	25.13
Soybeans	14.11	27.45	28.43	28.19
Potatoes	18.08	29.47	30.09	31.10
Tobacco	25.02	31.74	33.97	35.29
Calculated increase				
Corn		10.38	16.28	17.85
Oats		12.93	15.25	15.17
Soybeans		10.31	12.87	14.68
Potatoes		9.01	11.40	14.04
Tobacco		6.17	6.28	7.56

In the tobacco rotation the fertilizers are all applied to the tobacco crop, which is one reason for the smaller apparent increase in wheat after this crop. The total yield of wheat, however, is larger after tobacco than after any other crop. It is probable that it would further increase the yield of wheat to fertilize that crop also. The land selected for the tobacco rotation, however, is naturally more fertile than that used for the other rotations.

Table 12 shows the financial outcome on the similarly-treated land in the four cereal rotations. At the valuations employed the soybean rotation is decidedly ahead. Of course a different scale of values would alter the result, and a longer trial is needed.

TABLE 12.—Comparison of Miami County cereal rotations. Annual value per acre of total crops and of increase from fertilizers

Rotation	None	Acid phosphate	Acid phosphate Muriate potash	Acid phosphate Muriate potash Nitrate soda
Average value of yield per acre				
I Corn-oats-wheat-clover	$33.24	$45.07	$47.38	$45.93
II Corn-soys-wheat-clover	44.35	58.80	59.96	56.10
III Corn-corn-wheat-clover	35.59	43.02	47.15	47.01
V Corn-wheat-clover	29.57	35.56	43.16	45.18
Average value of increase per acre				
I Corn-oats-wheat-clover		$12.42	$14.95	$13.98
II Corn-soys-wheat-clover		10.45	13.07	11.70
III Corn-corn-wheat-clover		9.14	11.56	10.19
V Corn-wheat-clover		7.02	14.46	15.54

WHAT THIS OUTCOME MEANS TO MIAMI COUNTY

The statistics collected by the township assessors show that during the 10 years, 1910 to 1919, an average of 56,000 acres of corn, which yielded an average of 41.6 bushels per acre, and 28,000 acres of wheat, averaging 17.3 bushels per acre, were grown in Miami County; that livestock was kept in sufficient numbers to produce 100,000 tons of manure during 5 months of winter feeding, and that 4,000 tons of commercial fertilizers were purchased annually. This would give nearly 2 tons of manure for each acre planted in corn and about 150 pounds of fertilizer for each acre sown in wheat, if the manure and fertilizers were all given to these two crops.

Excluding the soybean rotation, for purposes of comparison, as soybeans have not been generally grown in the county, the yield of corn on the unfertilized land at the experiment farm for this period has been 43.7 bushels, and when grown after oats or corn the yield of wheat has been about 11 bushels.

Acid phosphate, used at the rate of 200 pounds per acre for each crop, has added 8 bushels to the yield of corn, and the same quantity of acid phosphate, reinforced with 50 pounds of muriate of potash, has added nearly 13 bushels.

Two tons of manure, if taken directly from the stable to the field without exposure to the weather, would contain as much potash as 50 pounds of muriate of potash, so that the careful saving of the manure produced in Miami County and applying it to all the land going into corn, with the addition of 5,600 tons of acid phosphate, would probably increase the corn crop of the county by at least half a million bushels.

Two hundred pounds of acid phosphate has raised the yield of wheat on the experiment farm from an unfertilized yield of 11 bushels to one of 22 bushels where the wheat has followed oats or corn, or to 27 bushels when the wheat has followed soybeans. It would seem altogether probable, therefore, that the average yield of wheat for the county might be increased to at least 24 bushels by increasing the fertilizer dressing to 200 pounds per acre, and making a larger use of the soybean.

The average yields in the soybean rotation on the experiment farm have been 55 bushels of corn and 14 bushels of wheat on unfertilized land, and 66 bushels of corn and 27 bushels of wheat after 200 pounds of acid phosphate.

Such yields as these would mean the annual addition of more than a million dollars to the county's wealth, for the experiments show that the yields of the hay and other crops grown in rotation would pay all cost of the fertilizing, including the cost of handling the increased crops produced by the fertilizers.

VARIETY COMPARISONS

DEPARTMENT OF AGRONOMY

CORN

Variety tests have been conducted with corn at the Miami County Experiment Farm for the last 8 years. Ten different varieties have been tested during this period. The yields of grain are given for each year of the test and the average yields of grain and stover. Of the varieties tested the full period, Darke County Mammoth stands highest in yield, with Cook's 75, a strain of Reid corn, second. The largest yield of stover is found with Connor's Prolific, the Boone County White being second.

TABLE 13.—Varieties of CORN, Miami County Experiment Station

Variety	Yield per acre (bushels)								Average	
	1912	1913	1914	1915	1916	1917	1918	1919	Grain	Stover
									Bu.	*Lb.*
Leaming	49.80	48.61	63.31	59.37	52.07	63.25	52.71	58.20	55.91	2,213
Clarage	.....	59.91	63.12	57.53	46.64	60.21	53.81	57.91	57.02	2,194
White Cap	.....	55.86	58.21	59.13	48.64	57.44	47.05	67.13	56.21	2,491
Cook's 75	64.03	57.29	64.40	58.89	52.85	62.87	68.24	65.48	61.76	2,671
Reid (Orcutt)	.....	59.84	62.93	55.56	54.87	63.63	63.62	69.10	61.36	2,824
Ohio 84	44.74	47.60	61.09	52.33	48.69	58.64	48.62	55.13	52.10	2,181
Boone Co. White	59.97	.....	67.95	71.76	59.60	60.15	64.09	75.00	65.50	3,681
Leaming-Cuppy	.....	48.53	61.16	.....	.....	.....	.....	.....	.....	.....
Darke Co. Mam	65.22	58.39	65.55	61.87	54.50	67.87	68.43	71.91	64.22	2,754
Connor's Prolific	.....	.....	.....	.....	42.79	47.25	56.28	64.12	52.61	3,872

OATS

Seven varieties of oats and one variety of barley have been tested for 8 years, emmer for 6 years and spring wheat for 2 years. The yields given in the table are by weight, 32 pounds constituting a bushel of oats and emmer, 48 pounds a bushel of barley and 60 pounds a bushel of spring wheat. The variety known as Ohio 6203 stands first in yield, Big Four, second and Ohio 6222, third.

Taking into consideration the weight per bushel, the barley tested is about 10 bushels behind the best varieties of oats, but much ahead of emmer.

TABLE 14.—Varieties of OATS, Miami County Experiment Farm

Variety	Yield per acre (bushels)								Average yield per acre	
	1912	1913	1914	1915	1916	1917	1918	1919	Grain	Stover
									Bu.	*Lb.*
Big Four	78.17	62.99	48.60	69.03	66.69	55.87	76.40	47.89	63.20	2,673
Silver Mine	77.76	61.07	44.38	58 78	62.53	54.38	73.90	55.51	61.04	2,695
Swedish Select	78.59	61.12	42.29	56.27	65.18	49.38	74.99	42,89	58.84	2,515
Ohio 7009	74.21	44.14	48.75	64.76	75.55	59.53	65.62	37.66	58.78	1,708
Ohio 6203	75.15	60.75	45.63	66.85	70.34	56.96	75.46	56.95	63.51	2,629
Ohio 6222	78.70*	51.85	54.38	67.78	60.46	58.76	79.37	50.94	62.78	2,736
Wideawake	71.40	57.11	47.19	61 79	57.42	54.69	69.37	43.91	57.80	2,951
Oderbrucker barley	32.08	36.03	22.21	32.40	41.89	43.75	42.92	33.54	35.60	2,125
Iowa 103	.....	.....	.....	.....	.....	58.76	71.08	45.90	58.58	1,928
Emmer	35.94	61.56	35.78	26.12	N. G.	20.94	.....	.....	36.07	2,346
Spring Wheat— Blue Ribbon	.....	.....	.....	.....	.....	.....	23.33	4.33	13.83	1,895

*A different selection of Improved American used in 1912.

WHEAT

Fifteen varieties of wheat have been tested for 7 years, grown in two different rotations. As the same check variety is used in each rotation it is possible to put them on a comparative basis. Averaging the 7 years' work, the Gladden is first in yield, Gypsy second, Trumbull third, Valley fourth and Portage fifth.

TABLE 15.—Varieties of WHEAT, Miami County Experiment Farm

Variety	Yield per acre (bushels)							Average yield per acre	
	1913	1914	1915	1916	1917	1918	1919	Grain	Straw
								Bu.	*Lb.*
Fultz	35.55	31.27	35.73	23.21	35.85	23.66	21.08	29.48	40.76
Trumbull	41.44	37.32	38.90	25.91	38.52	26.99	23.99	33.30	37.29
Ohio 8106	36.83	34.15	33.72	27.15	33.01	24.77	19.58	29.89	37.34
Poole	38.52	34.99	33.57	27.72	32.02	27.77	18.50	30.44	38.27
Portage	49.44	35.11	39.90	20.16	34.19	21.66	23.66	32.02	37.11
Gipsy	39.32	35.37	38.12	28.78	36.30	29.76	28.33	33.71	42.71
Gladden	43.85	35.42	36.16	28.44	40.91	32.31	29.08	35.17	46.33
Mediterranean	38.47	32.92	33.49	27.50	39.05	19.33	27.50	31.18	37.52
Rudy	43.22	33.76	35.26	25.72	38.32	14.27	26.75	31.04	34.06
Turkey Red	38.58	37.48	30.53	23.53	29.52	20.49	26.05	24.95	36.39
Valley	42.10	41.29	35.48	26.69	34.27	23.38	26.00	32.74	40.68
Goens	37.94	42.76	38.56	21.53	36.43	16.77	24.70	31.24	35.96
Nigger	42.94	36.54	34.32	24.19	35.19	20.38	21.92	30.78	33.43
Velvet Chaff	36.77	37.71	33.90	23.44	35.02	24.21	21.25	30.33	38.52
Ohio 9920	.....	.....	.....	28.30	41.94	28.44	23.75	30.61	34.02

For five seasons tests of seeding wheat at different rates have been conducted, with results as indicated in the table. It has not been possible to seed wheat each date planned every season, but on five dates, 1 week apart, from September 15 to October 13, seedings have been made. The seedings made September 22 have given slightly the largest yield, with September 29 second, October 6 third and September 15 fourth.

TABLE 16.—Early and late seeding of wheat

	Sept. 1	Sept. 8	Sept. 15	Sept. 22	Sept. 29	Oct. 6	Oct. 13	Oct. 20	Oct. 27	Nov. 1
1915	.....	.....	23.33	30.00	26.67	24.67	11.33	2.33	2.00	.....
1916	5.37	.....	6.71	7.67	7.86	12.84	8.43	.....	6.32	.....
1917	39.83	42.50	43.00	46.00	47.45	40.33	29.67	10.33	11.17	.....
1918	34.47	11.73	11.73	19.43	10.45	10.27	11.73	3.30	.....	.....
1919	22.67	24.67	.....	27.17	31.17	26.00	22.83	21.50	.....	14.17
Average...	25.58	.....	21.19	26.05	24.72	22.82	16.80	9.36	6.50	.....

SOYBEANS

The soybean test has included eight varieties for six consecutive seasons, and for comparison a standard early variety of cowpeas—the New Era. In 1919 the frequent rains prevented threshing these varieties.

As a 6-year average the Elton stands highest in yield, the Ebony second, the Mongol third and Ohio 9035 fourth. The New Era cowpeas are much inferior to the soybeans in yield of seed.

TABLE 17.—Varieties of SOYBEANS, Miami County Experiment Farm

Variety	Yield per acre (bushels)						Average yield per acre	
	1913	1914	1915	1916	1917	1918	Grain	Straw
							Bu.	*Lb.*
Ohio 9100	12.81	22.00	16.75	17.81	18.54	20.75	18.11	2,190
Mongol	15.29	27.87	22.33	20.00	18.21	22.00	20.95	2,390
Elton	16.93	26.25	23.61	15.14	24.60	27.14	22.28	1,942
Ohio 9035	16.67	27.64	23.08	18.36	10.37	22.48	19.77	2,154
Ebony	15.62	19.66	20 05	20.22	27.91	24.69	21.36	2,241
Ohio 7496	20.26	26.56	25.07	12.97	9.19	20.25	19.05	2,453
Ohio 9016	17.12	23.61	24.33	9.97	14.16	18.91	18.02	1,920
Medium Green	15.81	23.00	23.83	15.14	10.71	19.42	17.98	2,122
New Era Cowpeas	8.67	9.37	3.17	3.25	7.22	2.00	5.61	2,631

Too wet to thresh soybeans in 1919.

BULLETIN
OF THE
Ohio Agricultural Experiment Station
NUMBER 344 JUNE, 1920

COUNTY EXPERIMENT FARMS IN OHIO

PART II

THE PAULDING COUNTY EXPERIMENT FARM

EIGHTH AND NINTH ANNUAL REPORTS, FOR 1918 AND 1919

CHARLES E. THORNE, DIRECTOR

CARY W. MONTGOMERY, CHIEF OF DEPARTMENT

R. R. BARKER AND H. R. HOYT, SUPERINTENDENTS
H. W. JOHNSON AND CARL DEISLER, FOREMEN

PERSONNEL

R. R. Barker resigned the superintendency of this farm December 31, 1918, and was succeeded by H. R. Hoyt. H. W. Johnson resigned the position of foreman July 21, 1919, and was succeeded by Carl Deisler.

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment, March 1, 1919

Original cost, land and buildings		$16,260.21
Permanent improvements to March 1, 1918		8,789.13
Permanent improvements made 1918:		
Buildings:		
Office, garage and shop	$1,054.65	
Concrete floor in tool shed	78.87	
Concrete floor in barn No. 1	172.13	
Painting house No. 1, hog house, fence and cotes	104.43	
Poultry house	35.00	
		1,445.08
Fence, wire, 100 rods		118.40
Tile drains, 302 rods at 88.6 cents		267.65
Total permanent investment		$26,880.47
Operating Equipment:		
Livestock: 2 horses and 2 mules, $725; 25 hogs, $896	$1,621.00	
Machinery, tools and harness	1,012.00	
Crops and feeds: corn, $235; oats, $200; hay, $110; straw, $10; mill feed, $18; soybeans (feed), $16; chopfeed, $10	599.00	
Seeds: corn, $45; clover seed, $81; soybean seed, $49; mixed seed, $6	181.00	
Fertilizer	50.00	
Building material: lumber	10.00	
Drain tile	30.00	
Containers	12.00	
Scales	103.00	
Fence material: posts, $4; barb wire, $1; wire fencing, $9	14.00	
Sundries: paint, $6; spray material, $4; twine, $2; coal, $2; field day material, $12; plot stakes and window sash, $11	37.00	
Hog equipment	351.00	
Office equipment	19.00	
Total operating equipment		4,039.00
Total investment		$30,919.47

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1919

Dr.

To Receipts

From County:		
Maintenance fund		$1,897.54
From Farm Sales:		
Livestock: hogs	$2,519.67	
Crops: corn, $36; oats, $285.72; soybeans, $25.25; sugar-beets, $284.67; wheat, $253.54; hay, $52.82; apples, $273.63; fodder, $8; seeds, $125.80	1,345.43	
Sundries: fuel, $3; machine hire, $8.10	11.10	3,876.20
Total receipts		5,773.74
In hands of Superintendent for payment of small bills		25.00
To balance forward from March 1, 1918		2,799.94
		8,598.68

Cr.

By Expenditures

For labor	$1,495.51	
For Current Expenses: seeds, $270.61; feeds, $563.75; binding material, $26; livestock equipment, $54.85; livestock incidentals, $1.25; spray material, $38.40; veterinary service, $159.75; horse shoeing, $28.20; implement repairs, $49.28; engine maintenance, $49.83; building renewal and repair, $40.30; water system maintenance, $27.83; office maintenance, $2.20; communication, $15.51; transportation, $104.85; publicity, $3; drainage maintenance, $26.11; fence maintenance, $52.85; plot fixtures, $5.90; containers, 70 cents; fuel and light, $86.24; kitchen stove, $40; miscellaneous hardware, $18.40	1,665.82	
For Permanent Improvements: building material, $972; concrete material and construction, $98.60; painting, $99.10; ornamental planting, $4.28; fence material, $86; drainage material and construction, $255.86	1,515.84	
For Machinery, Tools and Harness	79.27	
Total expenditures		$4,756.44
In hands of Superintendent for payment of small bills		25.00
Balance in County Treasury February 28, 1919		3,817.24
		$8,598.68

CROP AND LABOR STATISTICS, 1918

Area of farm, 92.2 acres
Area in farmstead, 4.45 acres
Area cultivated, 62.64 acres
Orchard, 2 acres
Permanent pasture, 5.5 acres
Roads (public), 5.5 acres
Roads and alleys (farm), 10.59 acres
Waste (open ditch), 1.56 acres

PLOT WORK	No. of plots	Total area	Total yield	Yield per acre
		Acres	*Pounds*	
Corn	51	5.1	15,760	44.15 bu.
Oats	57	5.7	13,217	72.46 bu.
Barley	1	.1	165	34.38 bu.
Soybeans	16	1.6	926	9.65 bu.
Wheat	41	4.68	6,149	21.9 bu.
Hay (clover)	61	7.25	24,750	1.71 tons
Hay (alfalfa)	6	.71	1,150	.81 ton
Sugarbeets	27	2.7	72,467	13.42 tons
Total plots and plot acres	260	27.84		
Clover seed from clover plots	11	1.3	103	1.32
FILLD WORK				
Corn (husked)		4.84	17,718	52.3 bu.
Corn (husked old orchard and hog lot)		2.33	3,441	
Corn (husked alleys)			4,340	
Corn (hogged off)		11.5	30,705	38.14 bu.
Oats		9.49	20,040	68.62 bu.
Oats (shock rows and end of plots)		1.	1,020	
Wheat (ends of plots and edges of fields)			157	
Hay (roads)			1,670	
Hay (soybean)		1.25	1,159	.46 ton
Hay (alfalfa)		1.25	1,030	.41 ton
Clover (pastured)		4.5		
Total field acres		36.16		
Total crop acres		64.00		
Less alleys cut for hay		1.36		
Total cultivated acres		62.64		

	Corn bu.	Oats bu.	Soybeans bu.	Wheat bu.	Hay (clover) tons	Sugar-beets tons
Highest yielding plots per acre	55.71	101.56	13.	33.33	2.44	19.84
Lowest yielding plots per acre	25.71	54.06	5.33	13.	.76	10.01

Number of work horses used on Paulding County Experiment Farm in 1918 4
Number of crop acres per work horse 16.16
Number man hours per year (March 1, 1918, to February 28, 1919, inclusive) 7,385
Number horse hours per year (March 1, 1918, to February 28, 1919, inclusive) 4,423

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment, March 1, 1920

Original Costs: land and buildings		$16,260.21
Permanent Improvements made to March 1, 1919		10,585.26
Permanent improvements made in 1919:		
Poultry house and yard commenced 1918 ($35 was charged to poultry house last year)	$38.48	
New door in house No. 1	19.54	
Tile ells and labor for tiling	38.73	
Plantings	19.86	
		116.61
Total permanent investment		$26,987.60
Operating Equipment:		
Livestock: 2 horses and 2 mules, $655; 25 hogs, $640	$1,295.00	
Machinery, tools and harness	990.00	
Crops, feeds, etc.: corn, $609; oats, $230; hay, $195; straw, $15; barley, $70; tankage and mill feeds, $87.50	1,206.50	
Seeds: corn, $10; barley, $14; clover, $170.45	194.45	
Fertilizer and lime	27.00	
Building material: lumber, $11; cement, $72; paint, $7; gravel, $33; plaster, 50 cents	123.50	
Drain tile	8.00	
Containers	9.00	
Fence material	20.00	
Sundries: spray material, $12; twine, $7; coal, $2; gasoline and oil, $3.80; field day material, $15; plot stakes, $10	49.80	
Hog equipment	381.50	
Office equipment	17.00	
Total operating equipment		4,321.75
Total investment		$31,309.35

RECEIPTS AND EXPENDITURES

For the year ending February 29, 1920

Dr.

To Receipts

From County		$1,923.65
From Farm Sales:		
Livestock: hogs	$2,709.36	
Crops: oats, $258.25; wheat, $274.08; sugar beets, $431.09; soybeans, $145.25; hay, $100.92; seeds, $161.94	1,371.53	
Sundries: implement hire, $4.40; livestock fees, $26; old sacks, $1.70; labor, $2.40; feed for stock left for breeding, $14.50	49.00	4,129.89
Total receipts		$6,053.54
In hands of Superintendent for payment of small bills		25.00
To balance forward from March 1, 1919		3,817.24
		$9,895.78

Cr.

By Expenditures

For Labor		$1,496.63
For Current Expenses: seeds, $57.63; spray material, $13.74; fertilizer, $10.75; binding material, $28.39; machine hire, $4.10; plot fixtures, $7; feeds, $809.97; veterinary services, $156.91; livestock fees, $20.75; livestock incidentals, $10; livestock equipment, $40.69; horse shoeing, $34.90; building renewal and repair, $71.14; implement maintenance, $41.81; fence maintenance, 91 cents; water supply maintenance, $13.82; engine maintenance, $44.54; transportation, $66.91; communication, $24.41; publicity, $8.10; office supplies, $3.55; fuel and light, $4.60; miscellaneous hardware, $24.14; painting, $27.70; rat poison, $1.01	1,527.47	
For Permanent Improvements:		
Building material	$175.20	
Water system	14.01	
Labor for installing tile	38.73	
Ornamental planting	19.86	
For machinery and tools	82.17	
For livestock: hogs	386.52	716.49
Transferred by commissioners to general county fund	1,500.00	
Total expenditures		$5,240.59
Held by Superintendent for payment of small bills		25.00
Balance in County Treasury February 29, 1920		4,630.19
		$9,895.78

CROP AND LABOR STATISTICS, 1919

Area of farm, 92.2 acres
Area of farmstead, 6.86 acres
Area cultivated, 62.19 acres
Young orchard, 2.5 acres
Permanent pasture, 5.5 acres
Roads (public), 5.5 acres
Roads and alleys, 8.09 acres
Waste (open ditch), 1.56 acres

Plot Work	No. of plots	Total area	Total yield	Yield per acre
		Acres	*Pounds*	
Corn	50	5	18,859	53.88 bu.
Oats	60	6	10,911	56.83 bu.
Wheat	31	3.1	5,193	27.90 bu.
Spring wheat	1	.1	40	6.67 bu.
Barley	1	.1	186	38.75 bu.
Hay (mixed)	58	6.887	17,080	1.24 tons
Alfalfa hay	5	.535	2,110	1.97 tons
Soybeans	16	1.6	1,557	16.22 bu.
Sugarbeets	27	2.7	70,639	13.08 tons
Total plots and plot acres	249	26.02	.....	.....
Clover seed from clover plots .58 plus roads and paths	.....	6.887	124	2.06 bu.

Field Work			
Corn	17.02	51,973	42.62
Oats	4.84	6,285	40.58
Wheat (winter)	1.25	2,160	28.80
Wheat (spring)	1.25	784	10.45
Barley	4.5	4,850	22.45
Pasture	4.5		
Hay (alfalfa and clover)	2.17	5,035	1.16
Total field acres	36.07		
Unharvested area	.107		
Total crop acres	62.19		

	Corn bu.	Oats bu.	Soybeans bu.	Sugar-beets tons	Wheat bu.	Hay clover tons
Highest yielding plots per acre	68.14	78.43	19.16	15.96	32.66	1.77
Lowest yielding plots per acre	46.57	32.19	7.66	9.73	21.00	.8

Number of work horses used on Paulding County Experiment Farm in 1919 4
Number of crop acres per work horse 16.15
Number of man hours per year (March 1, 1919 to February 29, 1920, inclusive) 7,075
Number of horse hours per year (March 1, 1919, to February 29, 1920, inclusive) 4,417

WORK OF THE YEAR 1918

R. R. BARKER

PERSONNEL

H. W. Johnson was employed as foreman March 1, 1918, and continued in that capacity until September 1, 1918, when he was drafted into the army. Iro Morhart, who had been employed as farm laborer since March 1, was given the temporary foremanship until Mr. Johnson returned. Mr. Johnson returned to the farm as foreman about February 1, 1919; Mr. Morhart then resigned to move onto a farm which he had rented for himself.

PERMANENT IMPROVEMENTS

A frame building 22 by 30 feet for use for office, garage, shop and seed storage was erected during September. The total cost, including two coats of paint and staining the interior of the office amounted to $1,054.65.

During July, house number one, the hog house, two cotes and some fence were given two coats of paint at a total cost of $104.43; earlier in the year some interior decorating was done in both dwelling houses at a total cost of $46.

During October a concrete floor was laid in the barn and in the toolshed at a cost for the barn floor of $172.13 and for the toolshed of $78.87.

Some tiling was finished in the spring which was begun the fall of 1917. During the fall of 1918, 302 rods were laid at a total cost of $267.65.

About 100 rods of wire fence were constructed at a cost of $118.40. Some individual litter pens were also built at a cost of $36.75.

Cypress floors were laid on the cement in the horse stalls during January, costing for material and labor $45.97.

HOG WORK

Three old sows that did not seem suitable to be retained in the breeding herd were sold to the butchers and three gilts from the spring litters were selected to take their places. Four gilts from the same litters were registered and sold to farmers for their breeding herds.

Cholera infected the herd shortly after the hogs were turned into the corn fields. The hogs were all immuned and after losing three the remainder all did well on the corn.

While the spring shoats were on pasture during the early part of the season a comparison of clover and alfalfa as a forage for hogs was made. The results showed slightly better gains made on the alfalfa than on the clover.

A part of one of the pasture fields had sweet clover seeded with the red clover. The sweet clover grew very rapidly and almost crowded the red clover out, but the hogs fed on the sweet clover very little. Shortly after the sweet clover began to head it was clipped with a mower about 1 foot from the ground. A second growth came on very rapidly after that and this was cut after it headed out. The last cutting was made with the cutterbar on the ground and all stalks that were cut off died, some few which were only dragged down lived throughout the season.

A comparison of hogging corn and soybeans and hogging corn and feeding tankage was attempted, but unfortunately the two lots of hogs got together just before weighing time, thus destroying the test. The hogs all made good gains while hogging down corn and being fed tankage. The best gains were those made on the last field when 49 hogs gained an average of 44 pounds per head in 21 days.

FINANCIAL SUMMARY OF THE HOG WORK FOR THE YEAR

DEBITS		CREDITS	
First inventory—		Second inventory—	
Livestock	$ 955.00	Livestock	$ 896.00
Land and equipment	1,447.42	Land and equipment	1,373.76
Feeds fed	1,457.69	Livestock sold	2,467.62
Man hours, 866½ at 30c per hour	259.95		
Horse hours 145 at 15c per hour	21.75		
Equipment purchased and repaired	35.00		
Interest on average of inventories	140.17		
Use of orchard pasture	6.00		
Miscellaneous			
Liquid louse killer	3.25		
Salt	1.80		
Immuning hogs	112.00		
Pasture	202.98		
To balance (gain)	202.98		
Total	$4,737.38		$4,737.38

ORCHARD WORK

The young apple orchard was cared for according to plan, the soybeans being left on the ground last season without harvesting. Several of the young trees were quite full of apples for the first time.

The old orchard had a heavy setting of fruit but perhaps because of improper spraying the fruit was not of first quality. However, 278 bushels of apples were sold which brought $271 on the market. In addition the farm help had all the apples they could use. During January and February the old orchard was very thoroughly pruned and should be in better shape another season.

EQUIPMENT

The main item of new machinery is a surface cultivator which was purchased in June.

GENERAL OBSERVATIONS

There are two date seeding plots in the alfalfa test block "U"; one is seeded the first week in July and the other the first week in August. The July seeding in 1917 was a complete failure while the August seeding gave a good stand of alfalfa. The bare plot was harrowed several times during the early part of the season and seeded again the first week of July, 1918. The result was a second complete failure to get a stand of alfalfa.

The alfalfa on all the plots made a fair first crop but the dry weather prevented it getting tall enough to pay to harvest a second time. The second crop was clipped, however, and allowed to remain on the ground.

The sweet clover seeded on one end of Field 2 seemed to cause the ground to plow easier and break up more mellow than the other end did when the field was plowed during November.

The soybeans got badly frostbitten last season, so badly, in fact, that they did not mature well, and it is probable that they have often been injured in other seasons.

The winter of 1917-18 was a favorable season for wheat on account of the heavy snow protection and for the same reason it was a poor time for a straw mulch test to show much difference. However, the mulched plots yielded a little more than the unmulched plots. This season it is reported that the wheat froze down worse on the unmulched plots than it did under the mulch, and probably there will be considerable difference in the yield of the plots.

WORK OF THE YEAR 1919

H. R. HOYT

PERSONNEL

H. W. Johnson was employed as foreman February 1, 1919, and continued in this capacity until July 21, when he resigned. Carl V. Deisler, who had been employed as laborer since March 1 was made acting foreman. Mr. Deisler was made foreman on January 1, 1920, and has been re-employed for another year.

PERMANENT IMPROVEMENTS

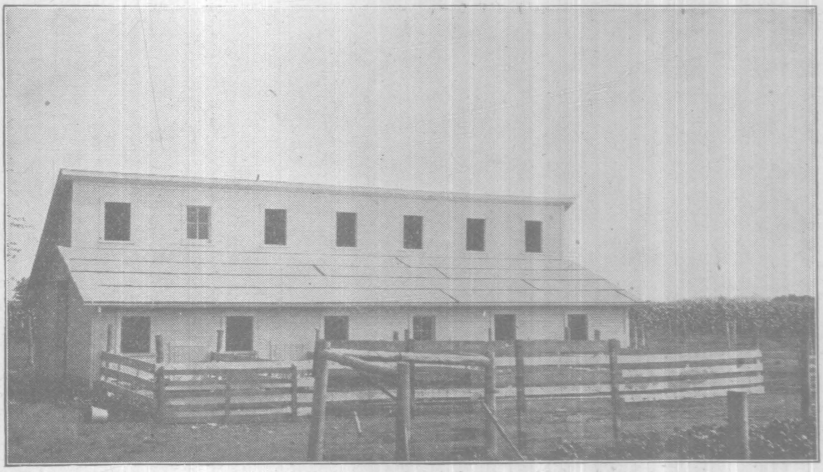
One hundred and five rods of drain tile, costing for tile and labor $93.19, was installed this year.

A new house and yard for housing the poultry of the men employed on the farm was constructed at a cost, including labor, painting, and material for yard, of $71.97. This work was done by the regular farm employees.

Shade trees and shrubbery, costing, including labor, $21.79 were planted.

The hog cotes, corn crib, fence and poultry house were painted at a cost, for material and labor, of $26.95.

Repairs, interior decorating and improvements were made on the two dwelling houses, costing, for material and labor, $76.65. Repairs to the plank laid over the concrete in the horse stalls cost $5.



Hog barn, Paulding County Experiment Farm

HOG WORK

Purebred Duroc-Jersey hogs are raised on the farm. The aged male hog was sold in May and another was purchased from the Miami County Experiment Farm in June.

There were nine brood sows on the farm at the beginning of the year. Eight of these sows farrowed in the spring, but the older sows did not do well and only 27 pigs were raised. From five sows that farrowed in the fall 26 pigs were raised. The older sows were sold and gilts from the spring litters were selected to take their places in the herd.

There were 15 shotes on a winter feeding test at the beginning of the year. Four gilts were sold during the year to farmers in the county for their breeding herds.

A comparison of hogging down corn and soybeans vs. hogging down corn with tankage fed as the protein supplement was made. The hogs getting the corn and tankage ration made the best gain. An experiment to determine whether it is profitable and practical to hog down corn is being carried on and results to date seem to indicate that the plan will be successful. A 4-year rotation is practiced in this experiment; corn, corn, barley, pasture. Both crops of corn are hogged off. The seeding for the pasture is made in the barley and consists of a mixture of 4 pounds of red clover, 2 pounds of alsike clover, 4 pounds of alfalfa and 1½ pounds of sweet clover per acre. This makes a very satisfactory pasture mixture.

FINANCIAL SUMMARY OF THE HOG WORK FOR THE YEAR

DEBITS		CREDITS	
First inventory—		Second inventory—	
Livestock	$ 896.00	Livestock	$ 773.00
Land and equipment	1,373.76	Land and equipment	1,313.43
Livestock purchased	386.52	Livestock sold	2,709.36
Feed fed	1,796.59	Service fees	26.00
Man hours, 1,350½ at 30c per hour.	405.15		
Horse hours, 327 at 15c per hour..	49.05		
Interest on average of inventories..	130.68		
Veterinary	127.71		
Registration fees	5.00		
Drugs, salt and lice spray	23.85		
Pasture of orchard	10.00		
Pasture, permanent and field	92.72	To balance (loss)	475.24
Total	$5,297.03	Total	$5,297.03

The very high prices of feeds during the summer and the great drop in August in the price of hogs, that had been fed these high-priced feeds, was responsible for the loss, for all hogs made good gains during the feeding period.

The automatic water system in use on the farm is a large factor in reducing the amount of labor required to care for the hogs.

EXPERIMENTAL WORK

All work was carried out according to plan, with the exception of some new crops grown and changes in rotations and dates of seeding. The changes made were growing a plot of spring wheat in the variety rotation, substituting barley for oats in the hog-work rotation and, because the alfalfa seeded in July had failed in three consecutive trials, the time of seeding was changed to as early a date in the spring as the land was in condition for the sowing of the seed. No nurse crop was used, a very good stand of alfalfa was obtained and a good crop of hay was cut during the summer.

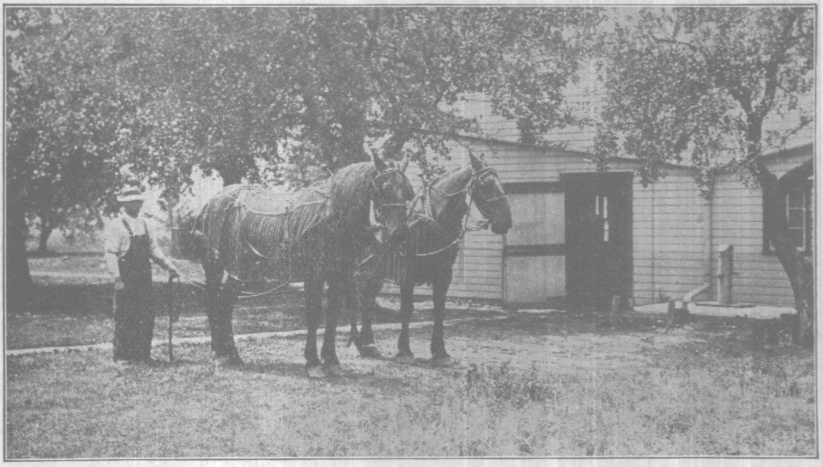
Corn when grown following sugarbeets in rotation does not seem to start off well, and a cooperative test with three farmers who practice this rotation was made to learn whether nitrate of soda

(50 pounds per acre) used on the corn would make a better growth. Results obtained this year indicate that the use of this fertilizer was of no advantage.

HORSES AND MULES

The same teams were used on the farm this year as last.

The total number of hours of work done by both teams was 4,417 and the total cost of feed, veterinary services, care of harness, shoeing and labor for the care of the team of horses was $512.15 and for the team of mules $431.50; a total cost, for the 4,417 hours of work done, of $943.65.



Team used on Paulding County Experiment Farm

LABOR

Two men are employed by the year to do the work on the farm. Extra labor was employed at threshing and harvest time and for 2 days at corn cutting.

The total cost for the extra labor employed, for crop production only, was $93.95 and the cost for the men regularly employed was $1,335 cash and $550 perquisites.

EQUIPMENT

The new equipment purchased this year was a straw spreader and a feed grinder. The straw spreader does fine work and will be a factor in reducing the amount of labor required to get the straw and coarse manure back on the fields.

Extensive repairs were made on the mower, wagon, grain drill and harness.

COST ACCOUNTING

The detailed cost account work of all farm operations, begun last year, was continued this year.

The object of doing this work is to determine the cost of production and the value of different crops through the study of rotations, distribution of labor, climatic conditions, value of fertilizers, labor required, cost of seed, etc. The figures for this work have not been summarized and a statement of the result will be made later.

ORCHARD WORK

The trees in both orchards were sprayed and cared for according to plan. The severe freeze the last of April killed nearly all of the fruit and a very small crop of apples was harvested.

Soybeans were grown in the young orchard. These were harvested for seed and the vines with some from another field were returned to the soil in the orchard. Several trees in the old orchard were destroyed by heavy winds during the year.

PUBLICITY

The teacher of agriculture in the public schools of the county brought several classes of students during the season to visit the farm and study the work being done.

The county agricultural agents for the Northwest District of the State visited the farm on June 21 to study the results of the work being done.

The annual field meeting was held on July 15. Rain threatened all the forenoon and was probably the means of keeping many people from attending the meeting. About 70 visitors were present and in the forenoon they were taken over the farm and shown how the experimental work is being done. In the afternoon the results of this work were explained by several members of the Station staff.

Several news items concerning the work of the farm were sent to the county newspapers during the year.

A straw spreader demonstration was held at the farm for the purpose of learning whether the type of spreader used in the demonstration would be practical to use for mulching winter wheat with straw.

SEEDS SOLD

Two hundred and seventy-five bushels of Ohio 6222 oats, 35.5 bushels of soybeans and 14.5 bushels of corn were sold to farmers for seed. Considerable interest in the growing of soybeans is being

shown by the farmers of the county. Not enough soybeans were grown on the farm to supply the demand and a part of those sold were purchased from the Station at Wooster.

GENERAL OBSERVATIONS

The season of 1919 at the farm was not favorable for high yields of farm crops. The spring months were very favorable for the preparation of the land and seeding of crops, the precipitation for April being slightly below normal. All of the oats and the field of barley were seeded before April 10.

During May the precipitation was 1.41 inches above normal. This delayed the planting of the corn, some of it not being planted until June 6. For June, July, August and September the total precipitation was 7.47 inches or 4.07 inches below the normal.

This dry condition was very unfavorable for the growth of the crops but was very favorable to the development of insects that do injury to farm crops. Chinch bugs did a great amount of damage to the winter and spring wheat and possibly to the block of oats adjoining the spring wheat. This block of oats made about 7 bushels less yield per acre than one on similar soil that was not infested with chinch bugs to any extent.

Although the growing season was so unfavorable we secured yields of 67.98 bushels of corn, 71.37 bushels of oats, 28.38 bushels of wheat, 1.53 tons of hay and 18 pounds of clover seed per acre from some plots in our 4-year rotations. The soybeans in Rotation II were seeded about 1 week earlier than the average planting date of past seasons and they were ripe enough to harvest in time to get the wheat sown on the 25th of September. All fields of soybeans grown this year had a heavy setting of well-filled pods. Rainy weather that commenced soon after the beans were cut continued for 2 weeks and made it impossible to thresh them, and a large percentage were lost through shattering.

The winter of 1918-1919 was very favorable for wheat and the wheat on the farm was not injured. The straw mulch was not of much benefit to the wheat but the seeding of clover stood the effect of the summer drouth where the wheat was mulched than did that seeded where the wheat was not mulched.

The yield of hay cut from the sections where the wheat was of the summer drouth better where the wheat was mulched than did that seeded where the wheat was not mulched.

In Field 9 where a test is being conducted to determine the effect on the physical condition of the soil of the plowing down of red clover, mammoth clover, and sweet clover, the block where the

sweet clover was grown, while it was a trifle harder to plow on account of the heavy sweet clover roots, fitted up much better than either of the other blocks.

COMPARISON OF ROTATIONS, CROP COSTS AND NET RECEIPTS PER ACRE

The object of the rotation experiments on this farm is to determine the effect on the physical condition of the soil of the growing of various crops, the effect of a crop on the one following it, the gross and net value of the crops, the distribution of labor and the adaptability of the rotation to the type of soil, climatic conditions and system of farming.

In Table 18 the average yield and gross values are given for a 5-year period.

TABLE 18.—Comparisons of rotations, Paulding County Experiment Farm

Five-year average yield and value per acre, 1915–1919

Crop	Yield			Value		
	Rotation I 4-year	Rotation II 4-year	Rotation III 3-year	Rotation I 4-year	Rotation II 4-year	Rotation III 3-year
Corn	52.5 bus.	52.6 bus.		$47.73	$47.02	
Sugarbeets			11.4 tons			$86.17
Oats	68.7 bus.		57.9 bus.	35.29		29.45
Soybeans		14.9 bus.			44.78	
Wheat*	18.2 bus.*	14.3 bus.*		28.69	23.09	
Oats	20.2 bus.	12.4 bus.		23.53	30.95	
Hay	2.5 tons	2.6 tons	2.3 tons	33.38	35.80	30.82
Seed (harvested, 1919)	18.0 pounds	18.0 lbs.	17.0 lbs.	8.25	8.25	7.79
Total average yearly value of all crops				$176.87	$189.89	$154.23
Average yearly value per acre of all crops				44.20	47.47	51.41

Rotation I—4-year, corn, oats, wheat, hay.
Rotation II—4-year, corn, soybeans, wheat, hay.
Rotation III—3-year, sugarbeets, oats, hay.

*Wheat winter-killed in 1916 and 1917 and oats were grown in all blocks where the wheat went excepting the block in Rotation II in 1916.

Values are computed by the market value of each crop, each year, at harvest time less the cost of marketing.

"Yields" are the average yields of the unfertilized plots.

Corn was badly frosted before harvest in 1916 and was of little value.

The fall of 1917 was very unfavorable for harvesting corn and all of the corn was damaged.

In 1918 and 1919 a detailed cost account of all work done on the farm was kept. The labor and miscellaneous costs, gross receipts, net value and cost per bushel or ton is given in Table 19 for the several rotations practiced on this farm.

When studying the table giving the cost of the crops, it should be kept in mind that the crops were grown on one-tenth of an acre plots. The cost of growing them in this manner would be somewhat higher than if they were grown in a field, but a comparison of these costs with costs of like crops, field grown, assures us that the order of their value would not be changed.

TABLE 19.—Average labor and miscellaneous costs and net receipts per acre Paulding County Experiment Farm

Crop	Man hours	Horse hours	Labor cost	Miscellaneous cost*	Total cost	Yield	Gross receipts	Net receipts	Cost per unit
Rotation I									
Corn	82.1	68.4	$34.89	$0.55	$35.44	53.8 bus.	$70.13	$34.69	Bus. $0.658
Oats	35.7	34.7	15.91	3.92	19.83	79.5 bus.	49.74	29.91	Bus. 0.249
Wheat	38.2	60.5	20.53	6.23	26.76	23.9 bus.	50.19	23.43	Bus. 1.119
Hay (seed, 1919 $8.25)	18.8	25.4	9.45	5.45	14.90	1.5 tons	30.22	15.32	Ton 9.93
Average net value of all crops, $25.84.									
Rotation II									
Corn	79.9	62.4	$37.14	$0.55	$37.69	52.2 bus.	$68.17	$30.48	Bus. $0.722
Soybeans	52.9	68.5	26.14	4.00	30.14	12.5 bus.	50.20	20.06	Bus. 2.411
Wheat	21.3	26.7	10.39	5.92	16.31	19.8 bus.	41.68	25.37	Bus. 0.823
Hay (seed, 1919 $8.25)	20.2	18.4	8.82	5.69	14.51	1.6 tons	32.87	18.36	Tons 9.068
Average net value of all crops, $23.57.									
Rotation III									
Sugarbeets	75.5	140.7	$43.75†	$3.98	$95.73	11.9 tons	$129.15	$33.42	Ton $8.044
Oats	24.5	23.1	10.81	3.58	14.39	61.0 bus.	38.12	23.73	Bus. 0.235
Hay (seed, 1919 $7.79)	13.0	12.7	5.80	4.19	9.99	1.3 tons	26.64	16.65	Ton 7.684
Average net value of all crops, $24.60.									
Rotation IV									
Corn	52.8	95.8	$30.21	$0.54	$30.75	35.1 bus.	$45.86	$15.11	Bus. $0.876
Oats	28.0	26.0	12.30	3.59	15.89	62.9 bus.	39.53	23.64	Bus. 0.252
Average net value of all crops, $19.37.									

†Plus $24 paid to Sugar Company each year, per acre, for extra labor.

*Miscellaneous cost: Charge is made for seed, twine and for the fuel and oil used in threshing. Fuel and oil charge for oats is 2 cents, wheat, 3½ cents, and soybeans 8 cents, per bushel. Prices used are those for which the crops would have sold for, each year, at time of harvest less the cost of marketing. Man hours are charged at 30 cents and horse hours at 15 cents per hour.

THE MAINTENANCE OF SOIL FERTILITY

DEPARTMENT OF SOILS

Four rotations are being conducted on the Paulding County Experiment Farm, namely:

Rotation I: Corn, oats, wheat, clover.
Rotation II: Corn, soybeans, wheat, clover.
Rotation III: Sugarbeets, oats, clover.
Rotation IV: Corn, oats. (Begun in 1915.)

Rotations I and II are duplicates in treatment of the similar rotations in Miami County, and were begun in 1912, as was also Rotation III. The plans of fertilizing in Rotations I and II are shown in Table 20, and those of Rotations III and IV in Tables 21 and 22. The arrangement of plots in Rotations I, II and III is shown in the accompanying diagram, and the outcome of the first 4 years' work is shown in the tables which follow.

TABLE 20.—Plan of fertilizing, Paulding County Experiment Farm

Pounds of fertilizing materials per acre for each crop

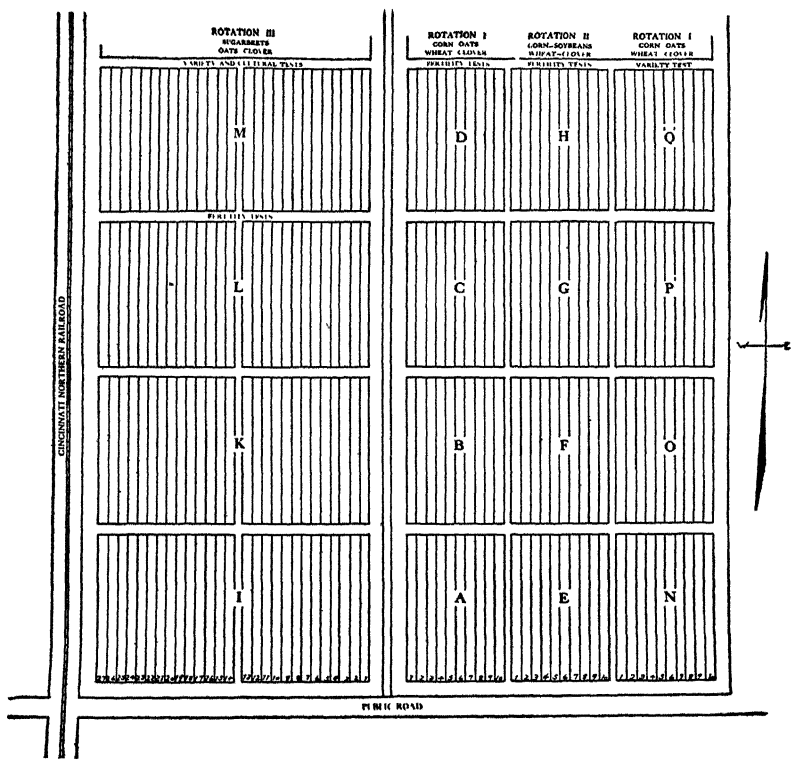
Plot	Acid phosphate	Muriate potash	Nitrate soda	Additional treatment	Acid phosphate	Muriate potash	Nitrate soda	Acid phosphate	Muriate potash	Nitrate soda
	Rotation I: Corn-oats-wheat-clover									
	On corn				On oats			On what		
1										
2	200				100			200		
3	200	50			100	20		200	20	
4										
5	200	50	50		100	20	30	200	20	80
6	200	50	50	*	100	20	30	200	20	80
7										
8	Manure, 8 tons							200	50	50
9	Manure, 8 tons, phosphated							200	50	50
10										
	Rotation II: Corn-soybeans-wheat-clover									
	On corn				On soybeans			On wheat		
1										
2	200				100			200		
3	200	50			100	20		200	20	
4										
5	200	50	50		100	20	30	200	20	80
6	130	50	20		70	20	10	160	20	20
7										
8	160	20	20		100			170		30
9	160	20	20	†	100			170		30
10										

*Sugar factory lime, 2 tons. †Catch crop to follow corn.

Fertilizers and manure on corn.—Six corn crops were grown in Rotations I and II before any benefit from the fertilizers became manifest. The seventh and eighth crops, however, begin to show some response to treatment, although it is still very irregular.

In the two rotations which receive identical treatments on the Miami and Paulding County Experiment Farms, the unfertilized corn averaged 51.3 bushels per acre on the Paulding farm and 51.6 bushels on the Miami farm for the 9 years, while the average yield on the fertilized land was 50.7 bushels on the Paulding farm and 62 bushels on the Miami farm, thus showing that the apathy of the soil of the Paulding County farm towards fertilizers is not due to its superior adaptation to corn.

Taking the 10-year period, 1910-1919, the average yield of corn in Paulding County as a whole, as shown by statistics collected by the township assessors, was 40.2 bushels per acre and that in Miami County was 41.6 bushels.



Arrangement of plots, Paulding County Experiment Farm. Plots one-tenth acre. Tile drains are laid east and west across these plots about 5 rods apart, emptying into the large open ditch running north and south through the middle of the tract

TABLE 21.—Fertilizers and manure on CORN, Paulding County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918 Yield Grain	1918 Yield Stover	1918 Increase Grain	1918 Increase Stover	1919 Yield Grain	1919 Yield Stover	1919 Increase Grain	1919 Increase Stover	Average Yield Grain	Average Yield Stover	Average Increase Grain	Average Increase Stover	Plot
	Rotation I: Corn-oats-wheat-clover	Block D				Block A				8-year average				
		u.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	42.86	3,300			55.71	*			50.21	3,532			1
2	Acid phosphate, 200 lb.	48.57	4,100	5.71	800	65.00		6.43		49.80	3,703	—1.65	76	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb.	51.43	4,200	8.57	900	67.86		6.43		50.38	4,037	—2.30	315	3
4	None	42.86	3,300			64 29				53.92	3,817			4
5	Acid phos., 200 lb.; mur. potash, 50 lb.; nitrate soda, 50 lb.	48.57	3,300	3.81	33	65.00		.47		54.21	4 005	.60	264	5
6	Acid phos., 200 lb.; mur. potash, 50 lb.; nitrate soda, 50 lb.; sugar factory lime, 2 tons	48.57	3,800	1.90	567	65.71		.95		50.73	3,862	—2.58	198	6
7	None	48.57	3,200			65.00				53.01	3,587			7
8	Untreated manure, 8 tons	48.57	3,400	.48	0	65.71		.95		52.88	3,595	.36	—12	8
9	Phosphated manure, 8 tons	51.43	3,400	3.81	—200	64.29		—.24		49.80	3,826	—2.23	200	9
10	None	47.14	3,800			64.29				51.54	3,646			10
	Average unfertilized yield	45.37	3 400			62.32				52.17	3 640			
	Rotation II: Corn-soybeans-wheat-clover	Block H				Block E				7-year average				
1	None	48.57	3,700			57.13				49.79	3,455			1
2	Acid phosphate, 200 lb.	50.00	3,600	1.91	0	60.71		2.86		47.94	3,387	—1.95	—78	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb.	50.00	3,400	2.38	—100	56.43		—2.14		46.88	3,478	—3.09	3	3
4	None	47.14	3,400			59.29				50.06	3,485			4
5	Acid phos., 200 lb.; mur. potash, 50 lb.; nitrate soda, 50 lb.	50.00	3,400	3.34	33	64.29		5.72		52.24	3,772	1.57	165	5
6	Acid phos., 130 lb.; mur. potash, 50 lb.; nitrate soda, 20 lb.	50.00	3,000	3.81	—333	67.86		10.00		50.31	3,528	—.99	—199	6
7	None	45.71	3,300			57.13				51.91	3,849			7
8	Acid phos., 160 lb.; mur. potash, 20 lb.; nitrate soda, 20 lb.	50.00	3,700	3.81	367	66.43		9.77		52.53	4,028	.55	166	8
9	Acid phos., 160 lb.; mur. potash, 20 lb.; nitrate soda, 20 lb.	48.57	2,900	1.91	—467	59.29		3.11		50.85	3,732	—1.18	—144	9
10	None	47.14	3,400			55.71				52.09	3,888			10
	Average unfertilized yield	47.14	3,450			57.31				50.98	3,669			

*In 1919 the stover was scattered by storm so that correct plot weights could not be obtained.

TABLE 22.—Fertilizers and manure on OATS and SOYBEANS following corn, Paulding County Experiment Farm
Yield and increase per acre

Plot	Treatment per acre	1918 Yield		1918 Increase		1919 Yield		1919 Increase		Average Yield		Average Increase		Plot
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
	OATS: in corn-oats-wheat-clover rotation	Block C				Block D				8-year average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	90.94	3,190	.....	.....	67.19	2,550	.....	.....	60.25	3,185	.....	.....	1
2	Acid phosphate, 100 lb	90.00	2,920	— 1.25	—193	59.06	1,510	—8.96	—880	58.26	2,979	—2.03	—186	2
3	Acid phosphate, 100 lb.; muriate potash, 20 lb	97.96	3,765	6.40	728	68 44	2,260	— .42	30	61.85	2,975	1.52	—172	3
4	None	91.87	2,960	.....	.....	69.69	2,070	.....	.....	60.37	3,127	.....	.....	4
5	Acid phos., 100 lb.; mur. potash, 20 lb.; nit. soda, 30 lb.	79.06	3,970	—11.24	1,093	73.12	2,360	4.68	183	61.37	3,186	2.01	140	5
6	Acid phos., 100 lb.; mur. potash, 20 lb.; nit. soda: 30 lb.	96.56	2,810	7.82	17	72.50	2,180	5.31	—103	62.34	2,877	4.01	— 88	6
7	None	87.17	2,710	.....	.....	65.94	2,390	.....	.....	57.32	2,884	.....	.....	7
8	Untreated manure on corn	92.17	3,050	2.81	343	70.62	2,340	3.33	— 7	57.38	2,973	— .17	107	8
9	Phosphated manure on corn	87.50	3,400	— 4.06	697	78.44	2,690	9.79	387	58.05	2,946	.37	55	9
10	None	93.75	2,700	.....	.....	70.00	2,260	.....	.....	59.02	2,986	.....	.....	10
	Average unfertilized yield	90.93	2,890	.....	.....	68.20	2 317	.....	.....	59.24	3 046	.....	.....	
	SOYBEANS: in corn-soybeans-wheat-clover rotation	Block G				Block H				7-year average				
1	None	5.33	2,180	.....	.....	17.83	1,680	.....	.....	15.63	1,657	.....	.....	1
2	Acid phosphate, 100 lb	10.17	1,090	3.23	—693	18.17	1,160	.17	—493	16.82	1,331	.91	—314	2
3	Acid phosphate, 100 lb.; muriate potash, 20 lb	11.33	1,020	2.77	—367	19.17	1,850	1.01	223	17.58	1,669	1.40	37	3
4	None	10.17	990	.....	.....	18.33	1,600	.....	.....	16.46	1,619	.....	.....	4
5	Acid phos., 100 lb.; mur. potash, 20 lb.; nit. soda, 30 lb.	12.50	1,250	2.33	292	19.00	1,910	.89	313	17.77	1,699	1.20	124	5
6	Acid phos., 70 lb.; mur. potash, 20 lb.; nit. soda, 10 lb.	11.17	1,030	1.00	107	16.67	1,500	—1.22	— 93	16.97	1,591	.29	62	6
7	None	10.17	890	.....	.....	17.67	1,590	.....	.....	16.79	1,484	.....	.....	7
8	Acid phosphate, 100 lb.	11.83	1,090	2.22	200	19.00	1,460	2.66	8	18.17	1,595	1.53	105	8
9	Acid phosphate, 100 lb.*	10.17	990	1.11	100	18.17	1,860	3.17	543	17.86	1,653	1.37	156	9
10	None	8.50	890	.....	.....	13.63	1,180	.....	.....	16.34	1,504	.....	.....	10
	Average unfertilized yield	8.54	1,237	.....	.....	16.87	1,512	.....	.....	16.45	1,573	.....	.....	

*Catch crop after corn.

TABLE 23.—Fertilizers and manure on WHEAT, Paulding County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918 Yield Grain	1918 Yield Straw	1918 Increase Grain	1918 Increase Straw	1919 Yield Grain	1919 Yield Straw	1919 Increase Grain	1919 Increase Straw	5-year average Yield Grain	5-year average Yield Straw	5-year average Increase Grain	5-year average Increase Straw	Plot
	Rotation I: Corn-oats-wheat-clover	Block B				Block C								
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	19.50	2,230	.....	.....	23.67	3,280	.....	.....	33.80	2,624	.....	.....	1
2	Acid phosphate, 200 lb.	30.00	2,200	10.50	70	23.17	2,410	—1.33	—387	32.27	2,337	—.81	—247	2
3	Acid phosphate, 200 lb.; muriate potash, 20 lb.	28.33	2,300	8.83	270	28.67	2,780	3.33	—533	33.37	2,450	1.02	—93	3
4	None	19.50	1,930	.....	.....	26.17	3,330	.....	.....	31.63	2,503	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 20 lb.; nitrate soda, 80 lb.	30.50	2,470	9.56	460	31.17	3,930	5.45	873	37.08	2,886	5.74	461	5
6	Acid phos., 200 lb.; mur. potash, 20 lb.; nitrate soda, 80 lb.	28.67	2,280	6.28	190	30.50	3,470	5.22	687	35.60	2,661	4.53	315	6
7	None	23.83	2,170	.....	.....	24.83	2,510	.....	.....	30.79	2,268	.....	.....	7
8	Acid phos., 200 lb.; mur. potash, 50 lb.; nitrate soda, 50 lb.	33.33	2,700	7.77	500	30.83	3,850	6.00	1,173	37.50	2,948	6.27	661	8
9	Acid phos., 200 lb.; mur. potash, 50 lb.; nitrate soda, 50 lb.	32.50	2,650	5.23	420	32.67	3,940	7.84	1,097	36.80	2,880	5.14	574	9
10	None	29.00	2,260	.....	.....	24.83	3,010	.....	.....	32.10	2,325	.....	.....	10
	Average unfertilized yield	22.96	2,147	.....	.....	24.87	3,032	.....	.....	32.08	2,430	.....	.....	
	Rotation II: Corn-soybeans-wheat-clover	Block F				Block G								
1	None	16.50	1,610	.....	.....	27.00	4,180	.....	.....	30.60	2,642	.....	.....	1
2	Acid phosphate, 200 lb.	21.00	2,040	5.67	427	29.50	4,030	3.28	— 330	35.40	2,835	4.96	171	2
3	Acid phosphate, 200 lb.; muriate potash, 20 lb.	23.67	1,980	9.50	363	32.00	3,180	6.55	—1,360	36.63	2,722	6.34	37	3
4	None	13.00	1,620	.....	.....	24.67	4,720	.....	.....	30.13	2,707	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 20 lb.; nitrate soda, 80 lb.	19.33	1,940	6.33	387	32.50	4,550	9.05	190	37.16	3,292	7.54	679	5
6	Acid phos., 160 lb.; mur. potash, 20 lb.; nitrate soda, 20 lb.	20.50	2,070	7.50	583	31.67	4,400	9.45	400	36.18	3,128	7.08	610	6
7	None	13.00	1,420	.....	.....	21.00	3,640	.....	.....	28.57	2,424	.....	.....	7
8	Acid phosphate, 170 lb.; nitrate soda, 30 lb.	19.67	2,020	5.17	523	24.50	3,930	1.78	93	35.13	3,067	5.32	459	8
9	Acid phosphate, 170 lb.; nitrate soda, 30 lb.	26.83	2,390	10.83	817	27.83	4,030	3.38	—3	36.40	3,212	5.35	421	9
10	None	17.50	1,650	.....	.....	26.17	4,230	.....	.....	32.29	2,975	.....	.....	10
	Average unfertilized yield	15.00	1,575	.....	.....	24.71	4,192	.....	.....	30.40	2,687	.....	.....	

Note: The wheat crops of 1916 and 1917 were destroyed by winter-killing, and oats was grown instead.

TABLE 24.—Fertilizers and manure on SUGARBEETS, Paulding County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918—Block K		1919—Block L		8-year average		Plot
		Yield	Increase	Yield	Increase	Yield	Increase	
		Tons	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	
1	None	14.040		13.600		12.882		1
2	Acid phosphate, 600 lb	12.711	—.545	13.300	—.233	12.638	—.009	2
3	Muriate potash, 200 lb	10.311	—2.162	12.300	—1.167	10.864	—1.548	3
4	None	11.689		13.400		12.176		4
5	Nitrate soda, 200 lb	14.356	2.697	16.100	2.017	13.378	1.518	5
6	Acid phosphate, 600 lb.; nitrate soda, 200 lb	15.467	3.837	16.650	1.883	13.355	1.812	6
7	None	11.600		15.450		11.226		7
8	Acid phosphate, 600 lb.; muriate potash, 200 lb	14.933	2.326	13.200	—2.700	13.505	2.262	8
9	Muriate potash, 200 lb.; nitrate soda, 200 lb	13.067	—.546	11.700	—4.650	12.096	.836	9
10	None	14.622		16.800		11.278		10
11	Acid phosphate, 600 lb.; muriate potash, 200 lb.; nitrate soda, 200 lb	15.422	1.081	15.450	—.283	14.376	3.043	11
12	Acid phos., 600 lb.; mur. potash, 200 lb.; nit. soda, 200 lb.; sugar factory lime, 2 tons	18.756	4.697	11.250	—3.417	14.273	2.885	12
13	None	13.778		13.600		11.442		13
14	Sugar factory lime, 2 tons	14.800	1.763	10.750	—2.333	*10.852	.656	14
15	Floats, 1,200 lb	12.844	.547	14.700	2.133	*11.219	1.240	15
16	None	11.556		12.050		*11.080		16
17	Yard manure, 10 tons	15.689	4.444	10.350	—1.500	12.928	1.838	17
18	Fresh manure, 10 tons	14.044	3.111	13.950	2.300	13.706	2.606	18
19	None	10.622		11.450		11.110		19
20	Fresh manure, 10 tons; sugar factory lime, 2 tons	15.733	4.104	13.900	1.773	13.682	2.025	20
21	Fresh manure, 10 tons; acid phosphate, 300 lb	15.111	2.474	15.550	2.777	14.334	2.133	21
22	None	13.644		13.450		*13.086		22
23	Mixed fertilizer, 2-8-2, 500 lb	13.378	.488	15.250	1.983	*13.766	1.207	23
24	Acid phosphate, 287 lb.; muriate potash, 20 lb.; nitrate soda, 52 lb	16.356	4.220	15.100	2.017	*14.340	2.308	24
25	None	11.382		12.900		*11.505		25
26	Acid phosphate, 300 lb.; muriate potash, 100 lb.; nitrate soda, 100 lb	15.156	3.774	15.100	2.200	*13.763	2.258	26
27	Steamed bonemeal, 175 lb.; muriate potash, 100 lb.; nitrate soda, 67 lb	14.444	3.062	16.700	3.800	*14.799	3.294	27
	Average unfertilized yield	12.548		13.633		11.724		

*7 years

TABLE 25.—Residual effect on OATS of treatment of previous sugarbeet crop. Paulding County Experiment Farm

Plot	Treatment per acre, on sugarbeets only	1918—Block I				1919—Block K				8-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	76.56	1,750	.....	.....	49.06	1,780	.....	.....	54.74	3,423	.....	.....	1
2	Acid phosphate, 600 lb	79.06	2,370	1.04	567	54.37	1,860	3.14	33	53.22	2,910	—1.56	—412	2
3	Muriate potash, 200 lb	61.87	2,120	—17.61	263	51.56	1,650	— 1.87	—223	50.62	2,839	—4.20	—382	3
4	None	80.94	1,910	.....	.....	55.62	1,920	.....	.....	54.86	3,121	.....	.....	4
5	Nitrate soda, 200 lb	72.81	2,270	— 5.21	400	51.25	1,960	— 4.58	— 26	53.51	3,547	—.74	521	5
6	Acid phosphate, 600 lb.; nitrate soda, 200 lb	76.87	1,940	1.76	110	50.00	1,750	— 6.04	—290	56.52	3,222	2.87	289	6
7	None	72.19	1,790	.....	.....	56.25	2,100	.....	.....	53.05	2,839	.....	.....	7
8	Acid phosphate, 600 lb.; muriate potash, 200 lb	79.37	1,860	11.14	243	52.81	1,710	— 2.82	—243	56.62	3,348	6.30	591	8
9	Muriate potash, 200 lb.; nitrate soda, 200 lb	67.81	1,530	3.54	87	42.50	1,540	—12.51	—267	49.47	3,017	—1.13	341	9
10	None	60.30	1,270	.....	.....	54.39	1,660	.....	.....	49.38	2,595	.....	.....	10
11	Acid phos., 600 lb.; mur. potash, 200 lb.; nit. soda, 200 lb.	76.25	1 760	12.71	360	53.12	1,800	.92	120	54.26	3,371	4.53	383	11
12	Acid phos., 600 lb.; mur. potash, 200 lb.; nit. soda, 200 lb.; sugar factory lime, 2 tons	58.12	1,940	— 8.65	410	43.44	1,210	— 6.56	—490	53.07	3,271	3.00	410	12
13	None	70.00	1,660	.....	.....	47.81	1,720	.....	.....	50.41	2,994	.....	.....	13
14	Sugar factory lime, 2 tons	79.06	1,770	10 10	143	40.62	1,400	—12.61	—397	50 78	2,561	1.10	— 37	14
15	Floats, 1,200 lb	58.44	1,430	— 9.47	—163	50.62	2,080	— 8.02	207	52.74	5,162	1.46	355	15
16	None	66.87	1,540	.....	.....	64.06	1,950	.....	.....	51.70	2,715	.....	.....	16
17	Yard manure, 10 tons	60.00	1,880	— 8.23	363	53.44	2,090	— 4.68	233	51.09	2,894	1.01	412	17
18	Fresh manure, 10 tons	56 87	2,180	—12.71	707	50.00	1,600	— 2.19	—163	48.48	2,767	—1.50	237	18
19	None	70.94	1,430	.....	.....	46.25	1,670	.....	.....	49.87	2,579	.....	.....	19
20	Fresh manure, 10 tons; sugar factory lime, 2 tons	81.87	1,880	11.56	430	58.12	1,840	9.77	137	53.68	2,686	3.86	81	20
21	Fresh manure, 10 tons; acid phosphate, 300 lb	64.69	1,430	— 5.00	— 40	44.69	1,670	— 5.71	— 67	48 71	2,874	—1.06	241	21
22	None	69 06	1,490	.....	.....	52.50	1,770	.....	.....	49.72	2,659	.....	.....	22
23	Mixed fertilizers, 2-8-2, 500 lb	65.94	1,580	— 1.66	143	49.06	1,880	.62	213	51.40	2,782	2.38	232	23
24	Acid phos., 287 lb.; mur. potash, 100 lb.; nit. soda, 52 lb.	76.56	1,650	10.41	267	48.12	1,610	3.75	47	50.78	2,615	2.45	173	24
25	None	64.69	1,330	.....	.....	40.31	1,460	.....	.....	47.63	2,333	.....	.....	25
26	Acid phos., 300 lb.; mur. potash, 100 lb.; nit. soda, 100 lb.	54.69	1,850	—10.00	520	53.78	1,830	13.47	370	49,38	2,767	1.74	434	26
27	Steamed bonemeal, 175 lb.; mur. pot., 100 lb.; nit. soda, 67 lb	69.37	1,580	4.68	250	57.19	1,970	16.88	510	49.44	2,495	1.81	142	27
	Average unfertilized yield	70.17	1,577	.....	.....	51.81	1 781	.....	.....	51.26	2,806	.....	.....	

TABLE 26.—Residual effect on CLOVER of treatment of previous crops in rotation. Paulding County Experiment Farm. Fertilizing materials and yield and increase of crop in pounds per acre

Plot	Fertilizing materials on previous crops					Yield and increase of hay					
						1918		1919		Average	
	Acid phosphate	Muriate potash	Nitrate soda	Lime	Manure	Yield	Increase	Yield	Increase	Yield	Increase
	Rotation: Corn-oats-wheat-clover					Block A		Block D		6-year average	
1						3,116		1,095		4,209	
2	500					3,284	112	2,105	561	4,717	312
3	500	90				3,874	646	1,937	−56	5,030	428
4						3,284		2,442		4,798	
5	500	90	160			4,126	604	2,189	−169	5,305	417
6	500	90	160	4,000		3,873	111	2,442	169	5,140	161
7						4,000		2,189		5,069	
8	200	50	50		8 tons	4,253	267	3,116	786	5,786	630
9	[1]520	50	50		8 tons	4,715	743	2,442	−28	5,536	293
10						3,958		2,611		5,330	
	Average unfertilized yield					3,589		2,084		4,851	
	Rotation II: Corn-soybeans-wheat-clover					Block E		Block F		6-year average	
1						2,358		2,358		4,436	
2	500					3,453	927	2,695	309	5,349	620
3	500	90				3,032	337	2,863	449	5,154	132
4						2,863		2,442		5,314	
5	500	90	160			2,526	−211	2,695	225	5,111	−133
6	360	90	50			3,621	1,011	2,611	113	5,446	292
7						2,484		2,526		5,104	
8	430	20	50			3,411	801	2,526	112	5,375	298
9	430	20	50			3,242	505	2,947	646	5,207	157
10						2,863		2,189		5,024	
	Average unfertilized yield					2,642		2,379		5,136	
	Rotation III: Sugarbeets-oats-clover					*Block L		Block I		7-year average	
1						1,431		2,274		5,470	
2	600					2,947	1,291	2,250	4	5,659	132
3		200				2,947	1,067	2,150	−67	5,371	−213
4						2,105		2,189		5,641	
5			200			1,516	−729	1,853	−393	5,375	−206
6	600		200			2,526	140	2,021	−280	5,139	−381
7						2,526		2,358		5,459	
8	600	200				2,779	225	2,021	−311	5,524	235
9		200	200			2,189	−394	2,021	−279	5,262	145
10						2,611		2,274		4,947	
11	600	200	200			2,442	−141	2,189	27	6,176	1,015
12	600	200	200	4,000		1,600	−954	1,600	−449	4,850	−524
13						2,526		1,937		5,588	
14				4,000		2,989	−42	2,526	954	4,957	−453
15	[2]					3,453	−84	2,947	1,740	6,005	774
16						4,042		842		5,053	
17					[3]10 tons	3,789	111	3,032	1,516	6,090	896
18					[4]10 tons	3,116	−196	3,116	927	5,520	182
19						2,947		2,863		5,481	
20				4,000	[4]10 tons	2,705	−326	2,274	−393	5,119	−262
21	300				[4]10 tons	3,200	84	2,779	309	5,253	−28
22						3,200		2,274		5,181	
23	[5]					3,453	421	3,453	955	5,480	395
24	287	100	52			3,032	169	2,189	−534	5,039	52
25						2,695		2,947		4,890	
26	300	100	100			2,611	−84	2,274	−673	5,013	123
27	[6]	100	67			2,189	−506	2,611	−336	5,062	172
	Average unfertilized yield					2,676		2,217		5,307	

*The clover for 1918 was badly smothered out by the oats crop of 1917.
[1]Including 320 lb. acid phosphate in phosphated manure.
[2]Raw phosphate rock, 1,200 lb. [3]Yard manure. [4]Fresh manure.
[5]Mixed fertilizer (2-8-2) 500 lb. [6]Steamed bonemeal, 175 lb.

TABLE 27.—Fertilizers, lime and manure on CORN and OATS grown in 2-year rotation. Paulding County Experiment Farm
Yield and increase per acre

Plot	Treatment per acre—all on corn	1918 Yield Grain	1918 Yield Straw	1918 Increase Grain	1918 Increase Straw	1919 Yield Grain	1919 Yield Straw	1919 Increase Grain	1919 Increase Straw	4-year average Yield Grain	4-year average Yield Straw	4-year average Increase Grain	4-year average Increase Straw	Plot
Corn		Block R				Block Q				4-year average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	38.57	.....	.....	.....	45.71	.....	.....	.....	48.21	.....	.....	.....	1
2	Acid phosphate, 200 lb	34.29	.....	—2.38	.....	43.57	.....	1.67	.....	47.86	.....	—.18	.....	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb	32.86	.....	—1.90	.....	35.71	.....	—2.39	.....	46.96	.....	—.89	.....	3
4	None	32.86	.....	.....	.....	34.29	.....	.....	.....	47.68	.....	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 50 lb.; nit. soda, 50 lb	42.86	.....	12.38	.....	39.29	.....	5.00	.....	52.68	.....	7.02	.....	5
6	Acid phos., 200 lb.; mur. potash, 50 lb.; nit. soda, 50 lb.; lime, 2 tons	32.86	.....	4.77	.....	47.14	.....	12.85	.....	54.54	.....	10.91	.....	6
7	None	25.71	.....	.....	.....	34.29	.....	.....	.....	41.61	.....	.....	.....	7
8	Untreated manure, 8 tons	31.43	.....	3.81	.....	45.71	.....	9.99	.....	53.21	.....	8.03	.....	8
9	Phosphated manure, 8 tons	35.71	.....	6.19	.....	48.57	.....	11.43	.....	55.89	.....	7.14	.....	9
10	None	31.43	.....	.....	.....	38.57	.....	.....	.....	52.32	.....	.....	.....	10
	Average unfertilized yields	32.14	.....	.....	.....	38.21	.....	.....	.....	47.45	.....	.....	.....	
Oats		Block Q				Block R				4-year average				
1		60.62	1,760	.....	—337	59.69	1,840	.....	.....	57.89	2,372	.....	.....	1
2		69.37	1,480	7.39		67.19	2,000	9.38	217	57.03	2,250	.57	—85	2
3		65.06	2,150	.73	277	64.16	1,800	8.22	73	55.41	2,440	.39	142	3
4		64.69	1,930	.....	.....	54.06	1,670	.....	.....	53.59	2,260	.....	.....	4
5	No treatment on oats	54.06	2,170	—10.32	330	74.06	2,030	16.46	290	54.76	2,410	1.58	224	5
6		64.06	2,550	0	800	63.44	1,770	2.29	—40	57.42	2,612	4.66	501	6
7		63.75	1,660	.....	.....	64.69	1,880	.....	.....	52.34	2,037	.....	.....	7
8		79.37	2,260	12.08	480	70.94	2,230	7.40	263	61 17	2,505	7.50	347	8
9		69.69	3,170	— 1.14	1,270	63.75	1,960	1.35	—93	58.59	2,850	3.59	572	9
10		74.37	2,020	.....	.....	61.25	2,140	.....	.....	56.32	2,397	.....	.....	10
	Average unfertilized yield	65.90	1,842	.....	.....	59.92	1,882	.....	.....	55.05	2,266	.....	.....	

Fertilizers on oats.—The 8-year average unfertilized yield of oats following corn has been 59.24 bushels, while that on the fertilized land has averaged 59.87 bushels. At the Miami farm the average yields under the same treatments have been 48.65 bushels on unfertilized land and 56.96 bushels after fertilizing.

The yields of oats following sugarbeets have been 51.26 bushels on the unfertilized land and 52.30 bushels on the fertilized land, the fertilizers being given to the beet crops only.

The 2-year rotation of corn and oats has been in progress 4 years, with average yields on the unfertilized land of 47.45 bushels of corn and 55.05 bushels of oats. For the same 4 years the yields in the 4-year rotation of corn, oats, wheat and clover have been 52.27 bushels of corn and 69.49 bushels of oats.

Fertilizers and manure on wheat.—The wheat crops have shown larger response to fertilizing than the corn or oats and in favorable seasons the yields have been good. The crops of 1916 and 1917 were entirely lost by winter-killing, but the average yields for the five crops thus far harvested have been 32.08 bushels per acre after oats and 30.40 bushels after soybeans on unfertilized land, and on the fertilized land, 35.44 bushels after oats and 36.15 bushels after soybeans. At the Miami County farm the unfertilized yields of wheat have been 11.84 bushels after oats and 14.11 bushels after soybeans, and the fertilized yields have been 26.45 bushels after oats and 26.42 bushels after soybeans. (The average increase after soybeans is less than that after oats because Plots 6, 8 and 9 receive smaller applications of fertilizing materials in the soybean than in the oats rotation.)

Fertilizers and manures on soybeans.—The unfertilized yields of soybeans have been 16.45 bushels on the Paulding farm and 21.21 bushels on the Miami farm, and the yields on the fertilized land have been 17.53 and 23.21 bushels respectively—an average gain of 1 bushel on the Paulding and 2 bushels on the Miami farm.

The relative yields of oats and soybeans under identical treatments are shown in Table 28.

TABLE 28.—Comparison of oats and soybeans

Treatment	Average yields—Bushels per acre			
	Paulding		Miami	
	Oats	Soybeans	Oats	Soybeans
None	52.24	16.45	48.65	21.21
Phosphorus	58.26	16.82	53.37	25.43
Phosphorus, potassium	61.85	17.58	57.99	25.65
Phosphorus potassium, nitrogen	61.37	17.77	60.44	23.45

It requires practically the same labor to produce an acre of soybeans as an acre of oats; the ordinary cost of seeding is a little greater for soybeans than for oats, unless the beans are sown in rows to be cultivated, in which case, however, the labor of cultivation will practically offset the saving in seed. The soybean should not be planted before the latter part of May, while oats must be sown early in April to make a good crop. The soybean straw is enough more valuable than oat straw to fully offset its smaller yield, and the soybean not only requires no nitrogenous fertilizer but adds some nitrogen to the land. The equivalent yields of grain in these tests have been a little more than 1 bushel of soybeans to 3 bushels of oats.

TABLE 29.—Fertilizers and manure on SUGARBEETS, Paulding County Experiment Farm. Financial outcome

Plot	Fertilizing materials per acre					Total value of increase	Total cost of treatment	Net gain or loss (—)
	Acid phosphate	Muriate potash	Nitrate soda	Lime	Manure			
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Ton*	*Dollars*	*Dollars*	*Dollars*
2	600	.....	.....	.....	.....	.....	9.00	.....
3	.....	200	.....	.....	.....	.....	15.00	.....
5	.....	.....	200	.....	.....	12.58	10.00	2.58
6	600	.....	200	.....	.....	16.47	19.00	—2.53
8	600	200	.....	.....	.....	29.68	24.00	5.68
9	.....	200	200	.....	.....	8.97	25.00	—16.03
11	600	200	200	.....	.....	43.97	34.00	9.97
12	600	200	200	2	.....	25.86	46.00	—20.14
14	.....	.....	.....	2	.....	2.54	12.00	—9.54
15	[1]	.....	.....	.....	.....	21.40	9.00	12.40
17	.....	.....	.....	.....	[2]10	28.09	10.00	18.09
18	.....	.....	.....	.....	[3]10	26.76	10.00	6.76
20	.....	.....	.....	2	[3]10	20.50	22.00	—1.50
21	300	.....	.....	.....	[3]10	20.27	14.50	5.77
23	[4]	.....	.....	.....	.....	17.79	11.00	6.79
24	[5]287	20	52	.....	.....	25.43	7.85	17.58
26	300	100	100	.....	.....	25.11	17.00	8.11
27	[6]	100	67	.....	.....	36.09	14.30	21.30

[1]Raw rock phosphate, 1,200 lb.
[2]Yard manure.
[3]Fresh manure.
[4]Mixed fertilizer, 2-8-2, 500 lb.
[5]287 lb. 14 percent or 250 lb. 16 percent.
The dressings on Plots 23 and 24 are calculated to carry equivalent amounts of the three fertilizing elements, as also those on Plots 26 and 27.
[6]Steamed bonemeal, 175 lb.

Fertilizers, lime and manure on sugarbeets.—The sugarbeet crop is a difficult one with which to experiment on account of the difficulty in securing an even stand, and there is considerable irregularity in the results obtained from year to year in this experiment. The average outcome indicates that acid phosphate when used alone has not increased the yield; but this is partly due to the comparison with Plot 1, which has regularly given a relatively large yield. This plot in each section lies nearest the large open ditch shown in the plan on page 277.

Table 29 shows the apparent financial outcome of this experiment, computing beets at $10 a ton, oats at 75 cents a bushel and hay at $20 a ton, with acid phosphate at $30 a ton, muriate of potash at $150, nitrate of soda at $100, sugar factory lime at $6, and manure at $1, all spread on the field.

While the results are too irregular to justify any but general conclusions, it appears that this soil is not deficient in one of the principal elements of fertility more than another, and that if a profitable increase is obtained it must be through the reinforcement of the supply of available nitrogen, phosphorus and potassium, all three. The largest increase has been obtained on Plot 11, receiving 1,000 pounds of a complete fertilizer, and the net gain for this dressing has been greater than that from half the quantity on Plot 26. The slow acting phosphates, raw rock and bonemeal, seem to have given better results than acid phosphate. Lime appears to have been a detriment.

Taken as a whole, the experiment would seem to encourage the use on sugarbeets of a complete fertilizer of much higher grade than any ready-mixed fertilizer ordinarily found on the market.

COMPARISON OF VARIETIES

DEPARTMENT OF AGRONOMY

CORN

The variety test with corn extends over 7 years and has included nine varieties. Of the varieties which have been tested the full period, Cook's 75 stands highest in yield, with Leaming second, Wheeler's Reid third, Orcutt's Reid fourth and Darke County Mammoth fifth. The last four are less than a bushel apart in yield.

A rate-of-planting test of corn has been conducted for 3 years, with the result that two plants per hill has averaged 51.18 bushels per acre, three plants 51.73 bushels and four plants 55.25 bushels.

TABLE 30.—Comparison of varieties of CORN, Paulding County Experiment Farm

Variety	Yield per acre							Average yield per acre	
	1913	1914	1915	1916	1917	1918	1919	Grain	Stover
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lb.*
Reid (Morisy)	40.97	49.22	73.58	38.23	72.33	.....	.....	54.87	4,117
Reid (Orcutt)	45.97	54.97	82.07	46.23	74.17	50.48	62.43	59.47	3,964
Reid (Wheeler)	47.36	67.53	77.25	47.01	76.84	34.76	66.73	59.64	3,704
Cook's 75	50.79	58.27	82.89	46.88	76.49	54.76	68.28	62.62	3,810
Ohio 84	48.54	48.22	75.00	45.02	71.67	50.48	55.28	56.32	3,274
Clarage (Wheeler)	51.50	61.72	73.35	47.55	75.24	42.63	58.29	58.61	3,351
Leaming P. D.	46.44	45.65	85.07	54.05	73.82	56.91	58.14	60.01	3,334
Darke County Mammoth	44.76	52.36	80.86	45.38	75.95	51.91	63.86	59.30	4,028
White Cap	.....	.....	.....	38.38	67.38	40.48	54.44	50.17	2,805
Improved Clarage	.....	.....	.....	.....	.....	50.48	66.43	.....	.....

OATS

The oat variety test has included 8 years' work and eight different varieties, also a variety of spring barley. The Ohio 6222 has averaged highest in yield, Big Four second, Little White third and Ohio 6203 fourth. In pounds per acre, Oderbrucker barley stands up very well in yield, barley being weighed at 48 pounds per bushel.

TABLE 31.—Comparison of varieties of OATS, Paulding County Experiment Farm

Variety	Yield								Average yield per acre	
	1912	1913	1914	1915	1916	1917	1918	1919	Grain	Straw
									Bu.	*Lb.*
Big Four	67.77	46.30	48.29	81.62	39.08	67.46	104.21	65.55	65.03	2,481
Silver Mine	69.95	38.96	37.76	77.09	48.22	73.25	82.42	36.41	58.01	2,458
Swedish Select	69.27	26.77	42.76	78.65	47.29	60.68	84.22	48.44	57.26	2,588
Little White	69.03	44.11	57.14	79.28	51.35	83.10	.....	65.16	64.17	2,810
Ohio 7009	59.33	.....	36.03	69.27	35.41	67.70	61.88	.....	54.94	1,877
Ohio 6203	71.88	27.87	46.11	80.83	47.05	74.81	80.47	49.76	59.85	2,361
Ohio 6222	77.80	36.93	53.06	85.21	39.31	74.71	94.06	80.78	67.73	2,979
Wideawake	64.96	38.02	42.60	63.96	38.85	58.64	71.56	40.94	52.44	2,823
OderbruckerBarley	.....	.....	26.56	49.38	22.19	52.71	34.37	38.75	37.33	1,892
Spring Wheat	.....	.....	.....	.....	.....	.....	. ....	6.67	6.67	1,150

WHEAT

In wheat nine varieties have been tested for 6 years, with results as indicated in the table. The Trumbull has given the highest average yield, with Turkey Red second, Gladden third and Portage fourth.

Attention should be called to the fact that in 1916 the wheat crop was entirely destroyed by winter-killing, while in 1917 the yields were greatly reduced. There are wide extremes in the wheat yields in this county.

TABLE 32.—Comparison of varieties of WHEAT, Paulding County Experiment Farm

Variety	Yield per acre						Average yield per acre	
	1913	1914	1915	1917	1918	1919	Grain	Straw
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lb.*
Nigger	49.24	35.91	40.98	11.83	21.97	28.84	31.46	3,378
Gladden	48.74	37.43	43.18	17.50	25.24	23.04	32.52	3,963
Mediterranean	40.31	29.62	28.47	15.17	22.51	28.92	27.50	3,107
Rudy	43.81	32.64	35.68	14.31	27.61	31.97	31.00	3,349
Turkey Red	45.01	35.81	42.99	13.87	28.83	33.08	33.26	3,913
Trumbull	47.11	39.29	43.85	17.08	33.69	28.34	34.89	3,852
Portage	54.84	38.44	32.12	9.12	26.21	30.58	31.88	3,417
Goens	39.04	33.58	26.55	15.66	.....	26.33	28.23	4,392
Velvet Chaff	42.21	33.08	38.14	14.33	25.64	27.17	30.09	3,792

SOYBEANS

Six years of tests are reported with soybeans. Eight varieties have been tested, though only four for the entire period. Of these the Elton variety is easily first, with the Ohio 9035 second and Ohio 9100 third. There has been considerable difficulty in getting soybeans to thoroughly mature in this county. In 1916 most of the varieties were killed by frost prematurely. Only early varieties should be grown.

TABLE 33.—Comparison of varieties of SOYBEANS, Paulding County Experiment Farm

Variety	Yield						Average yield per acre	
	1913	1914	1915	1917	1918	1919	Grain	Straw
							Bu.	*Lb.*
Medium Green	13.67	13.79	.....	13.70	7.33	*8.00	11.30	1,447
Elton	28.49	21.51	26.00	17.14	12.43	18.67	20.71	1,908
Ohio 9035	20.98	23.87	13.33	Frosted	5.53	17.50	16.24	1,914
Ohio 7496	19.17	20.73	7.50	12.50	6.96	17.00	13.98	1,442
Ohio 9100	22.38	15.18	12.17	16.02	13.39	12.67	15.30	1.466
Mongol	19.21	15.54	.....	.....	.....	.....	.....	.....
Ebony	20.34	15.95	.....	.....	.....	.....	.....	.....
Ohio 9016	16.77	18.24	15.08	.....	.....	.....	.....	.....

*All badly shattered; Plots 1 and 6 especially so.

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BULLETIN

OF THE

Ohio Agricultural Experiment Station

NUMBER 344 JUNE, 1920

COUNTY EXPERIMENT FARMS IN OHIO

PART III

THE CLERMONT COUNTY EXPERIMENT FARM

SEVENTH AND EIGHTH ANNUAL REPORTS FOR 1918 AND 1919

CHARLES E. THORNE, DIRECTOR

GARY W. MONTGOMERY, CHIEF OF DEPARTMENT

H. W. ROGERS, SUPERINTENDENT
H. S. ELLIOTT, FOREMAN

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment, March 1, 1919

Original costs: land and buildings		$ 6,500.00
Permanent Improvements to March 1, 1918		4,329.28
Permanent Improvements made 1918:		
Building new house	$1,645.10	
Concrete watering trough	10.25	
		1,655.35
Total permanent investment		$12,484.63
Operating Equipment:		
Livestock: horses and colt, $375; chickens, $130	505.00	
Machinery, tools and harness	858.00	
Crops, feeds, etc.: corn, $650; wheat, $170; hay, $250; straw, $10; soybeans, $270	1,350.00	
Seeds: corn, $25; clover and grass seeds, $75	100.00	
Fertilizer and lime	143.00	
Drain tile	100.00	
Fence material: posts	5.00	
Sundries: spray material, $15; containers, $11; salt, $3.	29.00	
Total operating equipment		3,090.00
Total investments		$15,574.63

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1919

Dr.

To Receipts

From County:		
Maintenance fund distribution		$2,099.22
From Farm Sales:		
Livestock and products: horses, $200; poultry, $33; eggs, $622.58	$855.58	
Crops and seeds: corn, $10.25; wheat, $219.12; soybeans, $156; stover, $10.50; apples, $179.11; potatoes, $41.45; seeds, $175.04	791.47	
Sundries: containers, 50 cents; communication, 40 cents; implement hire, $3.50; shingles, $1.63	6.03	
		1,653.08
In hands of Superintendent for the payment of small bills		25.00
Balance in Treasury, March 1, 1918		1,592.44
Total receipts		$5,369.74

Cr.

By Expenditures

For labor		$1,772.36
For Current Expenses: feeds, $161.71; seeds, $175.55; fertilizer and lime, $77.50; spray material, $33.43; soybeans, $2.55; horse shoeing, $16.70; livestock equipment, $6.80; livestock fees, $30; fence repair, $1.32; building maintenance, $1; water supply maintenance, $1.20; implement maintenance, $27.22; engine maintenance, $21.50; transportation, $21.72; communication, $25.18; publicity, $2.37; machine hire, threshing, etc., $36; containers, $5.15; miscellaneous hardware, $6.53; fire insurance, $37.	690.43	
For Permanent Improvement: building material and construction, $1,492.16; concrete and masonry, $82.57	1,574.73	
For Machinery, Tools and Harness	43.93	
Total expenses		$4,081.45
In hands of Superintendent for payment of small bills		25.00
Balance in County Treasury, February 28, 1919		1,263.29
		$5,369.74

CROP AND LABOR STATISTICS, 1918

Area of farm, 130.21 acres
Area in farmstead, 5 acres
Area cultivated, 73.37 acres
Orchard, 11.67 acres
Permanent pasture, 11.49 acres
Woodland, 14.19 acres
Roads (public), .77 acre
Roads and alleys (farm), 10.83 acres
Waste, 2.89 acres

Crop	Number of plots	Total acreage	Total yield	Yield per acre
PLOT WORK		*Acres*	*Pounds*	
Corn	49	7.31	19,659	38.45 bu.
Oats	10	1.	876	27.38 bu.
Soybeans	36	5.21	2,954	9.45 bu.
Potatoes	10	.5	2,436	81.2 bu.
Wheat	61	6.01	6,012	16.67 bu.
Hay (clover and timothy)	30	2.37	5,740	1.21 tons
Hay (soybean)	14	1.67	4,005	1.2 tons
Hay (cowpea)	1	.1	.420	2.1 tons
Total plots and plot acres	211	24.17		
FIELD WORK				
Corn		11.25	22,304	28.32 bu.
Soybeans		4.88	2,385	8.15 bu.
Soybeans (strip in forestry work)			210	
Wheat		6.3	7,350	19.44 bu.
Hay (timothy and clover)		10.74	37,935	1.77 tons
Hay (soybean)		7.	12,570	.9 ton
Clover (plowed under)		9.4		
Total field acres		49.57		
Total crop acres		73.74		
Less alleys cut for hay		.37		
Total cultivated acres		73.37		
Orchard (productive) apple		8.39	6,484	18.19 bu.
Orchard (non-productive) peach		3.28		
		11.67		

	Corn bu.	Oats bu.	Soyb'ns bu.	Potatos bu.	Wheat bu.	Hay: Clo. & tim. tons	Hay: Soybean tons
Highest yielding plots per acre	56.07	39.38	19.67	118.67	47.	3.75	1.96
Lowest yielding plots per acre	7.57	23.43	6.5	59.33	7.5	.38	.6

Number of work horses used on Clermont County Experiment Farm in 1918	4
Number crop acres per work horse	21.35
Number man hours per year (March 1, 1918, to February 28, 1919, inclusive)	6,777
Number horse hours per year (March 1, 1918, to February 28, 1919, inclusive)	4,559

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment, March 1, 1920

Original Costs: land and buildings		$6,500.00
Permanent improvements made to March 1, 1919		5,984.63
Permanent improvements made in 1919:		
Dwelling	$730.62	
Drives graveled	6.20	
Fencing	28.79	
Permanent plantings	21.18	786.79
Total permanent investment		$13,271.42
Operating Equipment:		
Livestock: horses and mules, $575; sheep, $180; chickens, $100	$855.00	
Machinery, tools and harness	942.00	
Crops, feeds, etc.: corn, $650; hay, $225; straw, $8; mill feed, $10	893.00	
Seeds: corn, $5; soybeans, $200; clover, $155	360.00	
Fertilizer and lime	80.00	
Drain tile	100.00	
Fence material: posts, $15; wire, $25	40.00	
Sundries: spray material, $25; containers, $14; twine, $2	41.00	
Total operating equipment		3,311.00
Total investment		$16,582.42

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1920

Dr.

To Receipts

From County		$2,045.19
From Farm Sales:		
Livestock: horses, $200	$ 200.00	
Crops: corn, $1; potatoes, $33; wheat, $1,436.79; soybeans, $209.63; hay, $145.05; apples, $232.95; peaches, $49.93; eggs, $490.72	2,599.07	
Sundries: fertilizer, $22.75; old sacks, $2.61; machine hire, $2.01	27.37	2,826.44
Total receipts		$4,871.63
Held by Superintendent for payment of small bills		25.00
To error in over payment of bills		3.75
To balance forward March 1, 1919		1,263.29
		$6,163.67

Cr.

By Expenditures

For Labor		$1,606.47
For Current Expenses: feeds, $112.89; livestock equipment, $12.21 horse shoeing, $20.25; livestock incidentals, $1.55; seeds, $110.19; fertilizer, $133.75; spray material,, $13.95; containers, $5.50; binding material, $21.85; building renewal and repairs, $1.41; implement maintenance, $26.97; engine maintenance, $16.65; water supply maintenance, $9.19; transportation, $34.42; communication, $26.54; publicity, $10.05; miscellaneous hardware, $5.30; insurance on buildings, $37; painting, $2.60		602.27
For Permanent Improvements: building	$718.22	
Concrete, etc.	12.40	
Fences	28.79	
Permanent plantings	21.18	
Gravel for driveways	6.20	
For Machinery, Tools and Harness	141.03	
For Livestock: horses, $250; sheep, $180.42	430.42	1,358.24
Total expense		$3,566.98
Held by Superintendent for payment of small bills		25.00
By error		8.11
Balance in County Treasury, February 28, 1920		2,563.58
		$6,163.67

CROP AND LABOR STATISTICS, 1919

Area of farm, 130.21 acres
Area in farmstead, 4.95 acres
Area cultivated, 74.42 acres
Orchard, 11.67 acres
Permanent pasture, 11.49 acres
Woodlot, 13.19 acres
Roads (public), .77 acres
Roads and alleys (farm) 10.83 acres
Waste, 2.89

PLOT WORK	Number of plots	Total acreage	Total yield	Yield per acre
		Acres	*Pounds*	
Corn	39	5.81	12,465	30.64 bu.
Soybeans	37	5.31	1,521	4.78 bu.
Potatoes	10	.5	1,398	46.6 bu.
Wheat	76	7.76	10,170	21.84 bu.
Hay (clover)	30	2.37	4,625	.98 ton
Hay (alfalfa)	14	.83	2,395	1.44 tons
Hay (soybean)	12	1.5	4,742	1.58 tons
Total plots and plot acres	218	24.08		
FIELD WORK				
Corn		7.	9,996	20.4 bu.
Soybeans		3.03	1,117	6.14 bu.
Wheat		20.07	25,225	20.95 bu.
Hay (clover and timothy)		3.74	10,435	1.4 tons
Hay (soybean)		7.	21,380	1.53 tons
Hay (oats)		1.	990	.5 tons
Clover (no crop)		7.		
Soybeans (disked down)		2.		
Total field acres		50.84		
Total crop acres		74.92		
Less alleys cut for hay		.5		
Total cultivated area		74.42		
Orchard (productive) apple		8.39	5,694	14 bu.
Orchard peach		3.28	782	5 bu.
Orchard area		11.67		

					Hay		
	Corn bu.	Soybeans bu.	Potatoes bu.	Wheat bu.	Cl. & tim tons	Alfalfa tons	Soybean tons
Highest yielding plots per acre	55.71	13.	86.67	37	2.15	2.02	2.3
Lowest yielding plots per acre	2.86	3.3	23.	5	.38	.97	.6

Number of work horses used on Clermont County Experiment Farm in 1919 4
Number crop acres per work horse 18.73
Number man hours per year (March 1, 1919, to February 28, 1920, inclusive) 6,615
Number horse hours per year (March 1, 1919, to February, 28, 1920, inclusive) 4,107

WORK OF THE YEAR 1918-19

H. W. ROGERS

PERSONNEL

H. S. Elliott has been foreman of the farm from the beginning of operations. The writer took up the superintendency November, 1919.

FIELD CROPS

A 4-year rotation is practiced in the field work: corn, soybeans, wheat, clover.

Corn.—A fairly good crop of corn was harvested in 1918. The seasonal conditions were good.

The 1919 crop in the variety and field work was very seriously damaged by root rot. Investigation by plant disease experts has indicated that the lack of vitality in the corn plant was partly due to insufficient available plant food elements.

Soybeans.—The growing of soybeans in this county is gaining in favor as a means of soil improvement as well as a substitute for clover, a stand of which it is difficult to obtain. A slightly diseased condition of the soybeans was noticeable in the 1919 crop.

When the beans are allowed to ripen for seed the yield that may be expected depends very largely upon the manner in which they are harvested and threshed. We have concluded that the use of the farm mower and hay rake is the cause of considerable loss due to the shattering of the beans. We feel that a better method, that has proved its worth on other farms, is by the use of the grain binder, binding the beans in small sheaves and shocking to dry before being threshed. In this manner very few are lost while cutting and handling.

To aid in the use of the binder, level cultivation of the beans should be practiced.

A variety forage test of soybeans drilled solid and cut for hay gave the following yields for 1919:

	Pounds per acre
Medium Green	3,320
Ohio 9100	4,600
Elton	3,140
Ebony	3,500
Ohio 9035	2,100
Mongol	2,600
Mammoth Yellow	1,200

In 1918 a forage test was made, drilling soybeans solid versus drilling in rows 28 inches wide and cultivating. This test was in connection with the deep and ordinary tillage work.

	Pounds per acre
Ordinary plowing, beans drilled solid	3,720
Ordinary plowing, beans drilled in rows	2,840
Deep plowing, beans drilled solid	2,000
Deep plowing, beans drilled in rows	1,940

But very little difficulty has been experienced in getting the beans properly inoculated with the nitrogen-fixing bacteria.

Wheat.—The 1919 wheat crop yielded a very high average for this county. The Portage variety in the field work averaged nearly 25 bushels per acre.

The wheat was all of a good quality and clean. The most of it was sold to the Clermont County farmers for the fall seeding.

Clover.—Great interest is centered in the growing of clover in this county. While plant food elements, lime and drainage have increased the yields, still there is an uncertainty about the clover crop. A very noticeable increase of clover plants was noted on the 1919 variety wheat crop, due to the application of manure mulch to the wheat during the winter.

The lime application on the permanent meadow work has had an influence in keeping down the growth of weeds and to some extent has stimulated the growth of the grasses.

The 1919 clover in the field work was clipped and left upon the ground because of the growth of weeds that it contained.

Alfalfa.—Several attempts have been made to establish alfalfa but so far with very little success. A fairly good stand was secured from a sowing or two but the plants pulled out during the winter. Indeed it seems difficult to get any kind of a tap-rooted plant on this type of soil to live through the winter. Grimm alfalfa did not seem to come through the winter better better than common alfalfa.

ORCHARD WORK

The young orchards are rapidly coming into maturity with good indications for the growing of quality apples. The cultivated-cover-crop and sod-mulch methods are employed in the management of the fertility orchard. The sod-mulch section is mowed and the trees mulched with the grass; the cover crop section is disked and broadcasted to soybeans that are either cut into the ground when mature or are harvested for seed and the crop residue returned and spread over the ground that has produced the crop.

The variety orchard, containing more than 40 different kinds of apples, is cared for by the cultivated-cover-crop method.

A complete cost account of the orchards has been kept since they were set out in 1913. See Table 34.

TABLE 34.—Clermont County Experiment Farm. Orchard Work

	Sod Mulch		Cultivated		Variety	
Date	Cost	Receipts	Cost	Receipts	Cost	Receipts
1913	$46.50		$46.50		$39.50	
1914	43.00		54.00		49.50	
1915	46.35		62.75	*$6.00	56.75	*$35.00
1916	59.62		65.62	*14.00	62.50	*20.00
1917	77.25		83.75	*12.00	74.25	*65.00
1918	94.37	$51.54	114.37	107.31	87.25	31.02
1919	46.90	47.13	241.25	206.79	86.60	10.23
Totals	413.99	98.67	668.24	346.10	456.35	161.25

*Receipts for soybeans.

A variety peach orchard of 3.28 acres was started in 1913. The yield has been very low.

PASTURE EXPERIMENTS

In the spring of 1914 a series of permanent pasture plots was laid out to determine the best methods of pasture improvement. The effects of phosphate, complete fertilizers, and manure are demonstrated by applications every 2 years.

An improvement has been noted on the plowed and disked plots that were seeded and treated with limestone and complete fertilizer. Also the plots receiving limestone and manure have shown marked improvement. Those plots that have received acid phosphate, and acid phosphate with combinations of potash, nitrate and lime show some improvement but for best results it would seem that grass seed must be sown.

POULTRY

A flock of nearly 200 White Leghorn hens is kept on the farm for egg production. The records for the 2 years ending September 30, 1919, show that they have been a profitable source of income.

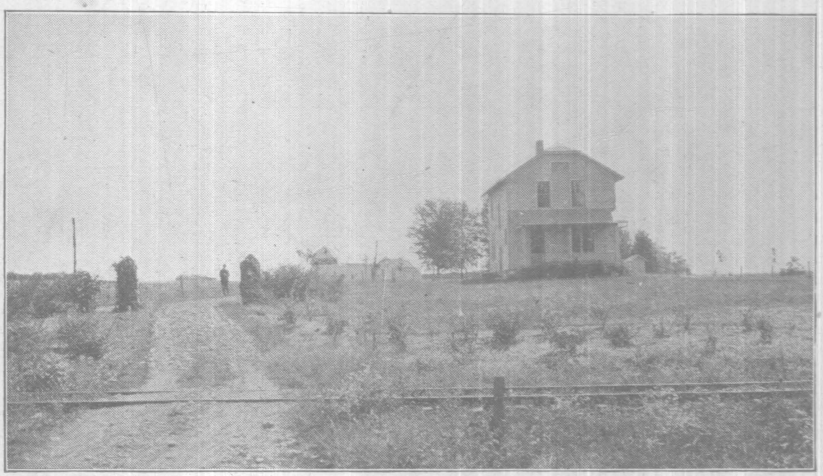
	1918	1919
Average number of eggs laid per hen	136	127
Average selling price eggs per dozen	$0.32	$0.40
Feed, labor, interest and depreciation cost per hen.	$2.86	$3.24
Net returns per hen	$1.38	$1.07

SHEEP

Twelve Shropshire ewes were recently placed on the farm for the consumption of the extra pasture and feed. It is expected that the lambs will be fattened and sold on the Cincinnati market.

PERMANENT IMPROVEMENTS

A new six-room residence, facing the pike at the front of the farm, costing $2,375.72, has been completed and is ready for occupancy by the farm foreman.



Foreman's house, Clermont County Experiment Farm

FIELD MEETINGS AND FAIR EXHIBIT

The field meeting held on the farm in June, 1919, was attended by several hundred farmers from Clermont and adjoining counties. The work on the farm was studied in the forenoon and the afternoon given over to the discussion of farm topics.

Annually an Experiment Farm exhibit is made at the Clermont County Fair.

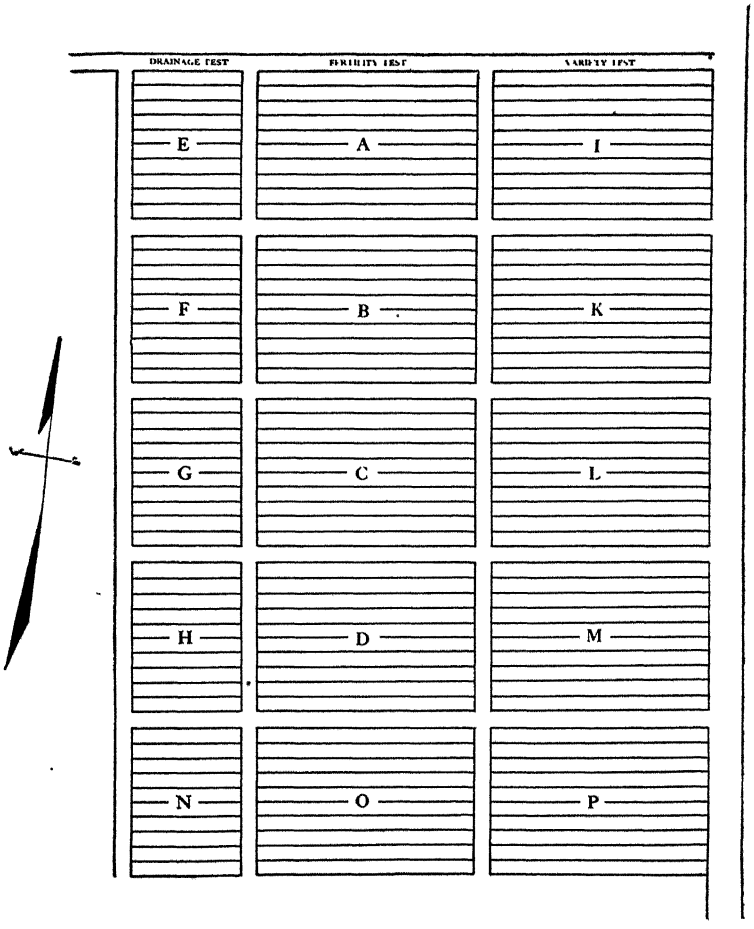
The county agent, S. B. Stowe, has been very active in promoting the field meetings and fair exhibits.

EXPERIMENTS IN THE MAINTENANCE OF SOIL FERTILITY

DEPARTMENT OF SOILS

Four experiments with fertilizers, lime and manure on crops grown in rotation are in progress on this farm, namely:

Rotation I: Corn, soybeans, wheat, clover, on drained and undrained land.
Rotation II: Potatoes, wheat, clover.
Rotation III: Corn, soybeans, wheat.
Rotation IV: Alfalfa, corn, wheat.



Arrangement of plots, Clermont County Experiment Farm

Blocks A, B, C, D. Fertility tests on drained land
Blocks E, F, G, H. Fertility tests on undrained land
Blocks I, K, L. M. Variety tests (drained land)
Blocks N, O, P, additional tests
The plots in each block are numbered from 1 to 10, beginning at the north side

The plan of fertilizing in these rotations is given in Table 35, the treatment of Rotation I being the same on the drained and undrained land, except for the drainage, and the same as that of Rotation II on the Miami and Paulding County Experiment Farms. The arrangement of plots in these rotations is shown in the diagram. The results for 1918 and 1919, and the average outcome for the entire period of the experiments are given in Tables 36 to 43.

TABLE 35.—Plan of fertilizing, Clermont County Experiment Farm

Pounds of fertilizing materials per acre for each crop

Plot	Acid phosphate	Muriate potash	Nitrate soda	Powdered limestone	Acid phosphate	Muriate potash	Nitrate soda	Acid phosphate	Muriate potash	Nitrate soda
	Rotation I: Corn-soybeans-wheat-clover									
	On corn				On soybeans			On Wheat		
1										
2	200				100			200		
3	200	50			100	20		200	20	
4										
5	200	50	50		100	20	30	200	20	80
6	200	50	50	2 tons	100	20	30	200	20	80
7										
8	Manure, 8 tons, phosphated							200	50	50
9	Manure, 8 tons, phosphated			2 tons				200	50	50
10										
	Rotation II: Potatoes-wheat-clover									
	On Potatoes				On wheat					
1										
2	200				200					
3	200	50			200	50				
4										
5	200	50	50		200	50	50			
6	400	100	100		400	100	100			
7										
8	Untreated manure, 8 tons				Untreated manure, 8 T.					
9	Untreated manure, 8 tons Acid phosphate, 200 lb.				Untreated manure, 8 T. Acid phosphate, 200 lb.					
10										
	Rotation III: Corn-soybeans-wheat									
1										
2	320			2 tons	200					
3	*			2 tons						
4										
5	320	50		2 tons	200	50				
6	*	100		2 tons						
7										

*Raw phosphate rock, 1,040 pounds.

FERTILIZERS, LIME AND MANURE ON DRAINED AND UNDRAINED LAND

This experiment was begun in 1912 on the land intended for the drained part, which was drained that season and next, and the comparison between the drained and undrained land was begun in 1914 by planting corn and soybeans on the undrained land. The bean crop was a failure, however, so that the crops thus far harvested on this land have been six of corn, five each of soybeans and wheat, and four of clover. In the accompanying tables the yields and increase for the drained land are given only for the years since the work began on the undrained land, in order to give a fair comparison.

The drains in this work were laid 30 inches deep and 50½ feet apart, at a total cost per acre of $33.81. The interest on this cost at 6 percent would be $2.03 per annum, or a total of $8.12 for the 4 years of a rotation period. The present cost would be considerably greater, however, and therefore in Table 36 this interest has been computed at $3 annually, or $12 for the rotation period.

The tables show that the unfertilized yields have been somewhat higher on the undrained than on the drained land, thus indicating a somewhat superior natural fertility in the undrained land, and showing that drainage alone, without the help of other soil ameliorants, has been a waste of money.

It costs no more to plant and cultivate the land for a small yield than for a larger one, but it does cost more to harvest and market the larger crop. In the next table this additional cost is estimated at 25 cents a bushel for the grains and $2 a ton for hay, as being probably fair average valuations on the farm at present. Corn stover and soybean straw are rated at $8 a ton and wheat straw at $3, or at about half the manurial value of these residues if their nitrogen, phosphoric acid and potash were computed at their cost in nitrate of soda at $100 a ton, 16-percent acid phosphate at $30 and muriate of potash at $150 spread on the field, which are the rates at which these fertilizing materials are computed in the table. In other words, these ton prices are equivalent to about 32 cents a pound for nitrogen, 9⅓ cents for phosphoric acid and 15 cents for potash, and a ton of these crop residues, at average Ohio analyses, would contain the quantities of each shown below:

	Pounds in one ton		
	Nitrogen	Phosphoric acid	Potash
Corn stover	35	3	18
Soybean straw	40	3	16
Wheat straw	10	4	20

Table 36 shows that the value of the increase from acid phosphate alone or from acid phosphate and muriate of potash combined, has not been enough greater on the drained than on the undrained land to pay interest on the cost of the drainage, but when lime is added, or where manure is used, furnishing large quantities of fertilizing elements at lower cost, the superior yields on the drained land not only pay for the fertilizers and interest on the drainage, but in two rotations will cover the entire cost of the drainage with a wide margin to spare.

TABLE 36.—Value of increase; cost of treatment and net gain per acre on drained and undrained land. Clermont County Experiment Farm

Plot No.	Total value of increase	Cost of increase				Net gain
		Fertilizer	Harvesting	Interest on drainage	Total	
Drained land						
2	$24.29	$ 7.50	$ 3.25	$12.00	$22.75	$ 1.54
3	40.58	14.25	5.88	12.00	32.13	8.45
5	64.09	22.25	8.94	12.00	43.19	20.90
6	83.19	34.25	11.00	12.00	57.25	25.94
8	87.29	22.55	12.66	12.00	47.21	40.08
9	115.86	34.55	15.74	12.00	52.29	63.57
Undrained land						
2	$20.64	$ 7.50	$2.53	.....	$10.03	$10.61
3	35.44	14.25	4.70	.....	18.95	16.49
5	47.25	22.25	6.02	.....	28.27	18.98
6	64.74	34.25	8.31	.....	42.56	22.18
8	53.08	22.55	6.99	.....	29.54	23.54
9	75.60	34.55	9.07	.....	43.62	31.98

The average yields of corn and wheat in Clermont County during the 6 years over which this experiment has been running have been about 30 and 13 bushels respectively, these yields including bottom land and land on which some manure and fertilizer were used. In this experiment the unfertilized yields have been 23½ bushels of corn and 8 bushels of wheat. Acid phosphate has increased the yields to 27 bushels of corn and 12¾ bushels of wheat, and the liberal treatment with manure, lime and fertilizers on drained land has increased the yields to nearly 50 bushels of corn and 24 bushels of wheat.

TABLE 37.—Fertilizers, manure and limestone on CORN, Clermont County Experiment Farm. Drained and undrained land Yield and increase per acre

Plot	Treatment per acre	1918 Yield		1918 Increase		1919 Yield		1919 Increase		Average Yield		Average Increase		Plot
		Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	
	Rotation I: Corn-soybeans-wheat-clover. Drained land	Block B				Block C				6-year average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	16.43	1,300	.....	.....	13.43	950	.....	.....	21.38	1,467	.....	.....	1
2	Acid phosphate, 200 lb.	22.14	1,500	6.66	217	26.86	1,450	11.29	450	27.05	1,633	6.21	168	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb.	19.71	1,600	5.19	333	41.00	1,800	23.28	750	34.26	1,917	13.96	452	3
4	None	13.57	1,250	.....	.....	19.86	1,100	.....	.....	19.76	1,463	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	24.13	1,750	9.46	483	43.29	1,700	23.15	650	38.78	1,928	18.35	480	5
6	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb. powdered limestone, 2 tons	32.86	1,800	17.10	517	41.14	1,750	20.71	750	40.74	2,017	19.63	583	6
7	None	16.86	1,300	.....	.....	20.71	950	.....	.....	21.78	1,417	.....	.....	7
8	Phosphated manure, 8 tons	42.71	2,130	26.33	847	51.29	2,150	32.77	1,250	49.12	2,313	29.29	935	8
9	Phosphated manure, 8 tons, powdered limestone, 2 tons	48.00	2,070	32.09	803	49.14	2,300	32.81	1,450	49.88	2,687	32.01	1,348	9
10	None	15.43	1,250	.....	.....	14.14	800	.....	.....	15.91	1,300	.....	.....	10
	Average unfertilized yield	15.56	1,275	.....	.....	17.03	950	.....	.....	19.70	1,411	.....	.....	
	Rotation I: Corn-soybeans-wheat-clover. Undrained land	Block F				Block G				6-year average				
1	None	12.86	700	.....	.....	15.14	900	.....	.....	21.98	1,325	.....	.....	1
2	Acid phosphate, 200 lb.	14.29	1,000	—4.28	67	20.86	1,000	6.10	100	24.02	1,275	.95	—119	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb.	28.00	1,500	3.71	333	31.71	1,800	17.33	900	31.16	1,700	6.98	236	3
4	None	30.00	1,400	.....	.....	14.00	900	.....	.....	25.28	1,533	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	40.29	2,000	13.53	613	25.43	1,300	8.38	233	33.09	1,675	7.89	146	5
6	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.; None	38.29	1,700	14.76	327	32.86	1,500	12.77	267	37.64	1,617	12.52	93	6
7	powdered limestone, 2 tons	20.29	1,360	.....	.....	23.14	1,400	.....	.....	25.05	1,518	.....	.....	7
8	Phosphated manure, 8 tons	44.86	2,140	25.62	900	39.43	1,100	16.67	—167	36.79	1,673	12.99	283	8
9	Phosphated manure, 8 tons; powdered limestone, 2 tons	42.86	2,500	24.67	1,380	35.43	1,500	13.05	367	36.26	1,708	13.72	447	9
10	None	17.14	1,000	.....	.....	22.00	1,000	.....	.....	21.28	1,133	.....	.....	10
	Average unfertilized yield	20.07	1,115	.....	.....	18.57	1,050	.....	.....	23.40	1,377	.....	.....	

TABLE 38.—Fertilizers and manure on SOYBEANS, Clermont County Experiment Farm. Drained and undrained land

Yield and increase per acre

Plot	Treatment per acre	1918				1919				Average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Beans	Straw	Beans	Straw	Beans	Straw	Beans	Straw	Beans	Straw	Beans	Straw	
	Rotation I: Corn-soybeans-wheat-clover. Drained land	Block A				Block B				5-year average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	13.17	2,310			4.00	660			7.90	1,322			1
2	Acid phosphate, 100 lb	12.00	2,180	—.84	—33	6.33	1,020	2.55	330	9.47	1,632	1.34	297	2
3	Acid phosphate, 100 lb.; muriate potash, 20 lb	14.33	2,340	1.83	223	7.00	1,030	3.45	310	10.93	1,764	2.59	417	3
4	None	12.17	2,020			3.33	750			8.57	1,360			4
5	Acid phos., 100 lb.; mur. pot., 20 lb.; nitrate soda, 30 lb.	15.50	2,920	4.11	1,037	7.33	1,260	3.50	590	11.90	2,012	3.49	672	5
6	Acid phos., 100 lb.; mur. pot., 20 lb.; nitrate soda, 30 lb.;*	15.67	2,310	5.06	563	8.17	1,510	3.84	920	13.07	2,094	4.82	774	6
7	None	9.83	1,610			4.83	510			8.10	1,300			7
8	Phosphated manure on corn	13.67	2,030	4.78	580	7.67	1,140	2.56	530	12.17	2,086	4.30	801	8
9	Phosphated manure and powdered limestone on corn	12.33	2,310	4.39	1,020	9.67	1,620	4.28	910	13.53	2,352	5.90	1,081	9
10	None	7.00	1,130			5.67	810			7.40	1,256			10
	Average unfertilized yield	10.54	1,767			4.46	682			7.99	1,309			
	Rotation I: Corn-soybeans-wheat-clover: Undrained land	Block E				Block F				5-year average				
1	None	12.00	1,680			8.33	1,700			9.46	2,012			1
2	Acid phosphate, 100 lb	11.67	1,900	—1.00	193	9.00	1,960	.78	387	9.87	2,168	—.13	141	2
3	Acid phosphate, 100 lb.; muriate potash, 20 lb	16.67	1,900	3.34	167	10.00	1,900	1.89	453	11.67	2,240	1.14	199	3
4	None	14.00	1,760			8.00	1,320			11.07	2,056			4
5	Acid phos., 100 lb.; mur. pot., 20 lb.; nitrate soda, 30 lb.	18.67	3,080	4.89	1,507	10.00	1,600	2.56	247	13.67	2,380	2.51	433	5
6	Acid phos., 100 lb.; mur. pot., 20 lb.; nitrate soda, 30 lb*	19.67	2,920	6.12	1,533	9.67	2,020	2.78	633	15.20	2,640	3.96	803	6
7	None	13.33	1,200			6.33	1,420			11.33	1,728			7
8	Phosphated manure on corn	16.67	2,900	3.34	1,233	12.00	1,780	5.56	400	14.13	2,612	3.18	837	8
9	Phosphated manure and powdered limestone on corn	15.33	3,380	2.00	1,247	13.00	1,820	6.44	480	16.20	3,008	5.62	1,187	9
10	None	13.33	2,600			6.67	1,300			10.20	1,868			10
	Average unfertilized yield	13.17	1,810			7.33	1,435			10.52	1,916			

*Powdered limestone on corn.

TABLE 39.—Fertilizers and manure on WHEAT, Clermont County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918				1919				Average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
	Rotation I: Corn-soybeans-wheat-clover. Drained land	Block D				Block A				5-year average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb*	
1	None	7.50	650	.....	.....	16.83	1,240	.....	.....	9.37	968	.....	.....	1
2	Acid phosphate, 200 lb	12.83	1,030	5.11	377	17.67	1,640	1.73	363	12.73	1,286	3.81	321	2
3	Acid phosphpatè, 200 lb.; muriate potash, 20 lb	12.17	770	4.22	113	18.33	1,500	3.27	187	13.63	1,262	5.15	301	3
4	None	8.17	660	.....	.....	14.17	1,350	.....	.....	8.03	958	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 20 lb.; nitrate soda, 80 lb.	19.17	1,650	10.95	1,027	23.50	2,040	9.44	683	19 07	1,826	11.01	899	5
6	Acid phos., 200 lb.; mur. pot., 20 lb.; nitrate soda, 80 lb.	21.33	1,630	13.05	1,043	28.33	2,600	14.39	1,237	21.70	1,940	13.62	1,045	6
7	None	8.33	550	.....	.....	13.83	1,370	.....	.....	8.10	864	.....	.....	7
8	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	18.50	1,490	10.17	823	22.50	2,100	10.61	1,047	19.70	1,842	12.30	1,089	8
9	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.*	24.50	2,130	16.22	1,347	28.17	2,710	18.23	1,973	24.20	2,338	17.50	1,697	9
10	None	8.33	900	.....	.....	8.00	420	.....	.....	6.00	530	.....	.....	10
	Average unfertilized yield	8.08	690	.....	.....	13.21	1,095	....	.....	7.87	830	.....	.....	
	Rotation I: Corn-soybeans-wheat-clover Undrained land	Block H				Block E				5-year average				
1	None	11.00	740	.....	.....	5.00	300	.....	.....	5.20	548	.....	.....	1
2	Acid phosphate, 200 lb	19.00	1,760	7.89	993	19.00	1,660	12.33	1,127	14.27	1,216	8.22	543	2
3	Acid phosphate, 200 lb.; muriate potash, 20 lb	18.33	1,400	7.11	607	25.33	2,080	17.00	1,313	16.40	1,704	9.51	905	3
4	None	11.33	820	.....	.....	10.00	1,000	.....	.....	7.73	924	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 20 lb.; nitrate soda, 50 lb.	24.67	2,120	14.01	1,327	25.67	2,360	15.45	1,307	19.33	1,632	11.58	692	5
6	Acid phos., 200 lb.; mur. pot., 20 lb.; nitrate soda, 50 lb.*	28.33	2,200	18.33	1,433	29.67	2,420	19.22	1,313	21.80	2,192	14.02	1,236	6
7	None	9.33	740	.....	.....	10.67	1,160	.....	.....	7.80	972	.....	.....	7
8	Acid phos. 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.	21.00	1,940	11.89	1,153	22.67	1,940	8.56	520	18.40	1,976	9.45	857	8
9	Acid phos., 200 lb.; mur. pot., 50 lb.; nitrate soda, 50 lb.*	24.33	2,440	15.44	1,607	26.00	2,640	8.44	960	20.80	2,276	10.69	1,011	9
10	None	8.67	880	.....	.....	21.00	1,940	.....	.....	11.27	1,412	.....	.....	10
	Average unfertilized yield	10.08	795	.....	.....	11.67	1,100	.....	.....	8.00	964	.....	.....	

*Powdered limestone on corn.

TABLE 40.—Residual effect on CLOVER of treatment of previous crops, Clermont County Experiment Farm

Plot	Total fertilizers, manure and limestone on previous crops of rotation	Drained land						Undrained land					
		1918		1919		4-year average		1918		1919		4-year average	
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase
	Rotation I: Corn-soybeans-wheat-clover	Block C		Block D		4-year average		Block G		Block H		4-year average	
		Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
1	None	758	.....	1,179	.....	1,105	.....	1,179	.....	1,600	.....	1,390	.....
2	Acid phosphate, 500 lb	1,853	1,011	1,389	210	1,463	410	1,347	336	2,105	645	1,726	273
3	Acid phosphate, 500 lb.; muriate potash, 90 lb	1,853	926	1,516	337	1,463	463	1,347	505	2,021	702	1,810	294
4	None	1,011	.....	1,179	.....	947	.....	674	.....	1,179	.....	1,579	.....
5	Acid phos., 500 lb.; mur. potash, 90 lb.; nitrate soda, 160 lb.	2,105	1,066	1,684	561	1,747	729	926	224	2,189	842	2,147	533
6	Acid phos., 500 lb.; mur. potash, 90 lb.; nitrate soda, 160 lb.; powdered limestone, 2 tons	2,442	1,375	2,484	1,417	2,579	1,491	2,442	1,712	2,695	1,179	2,337	688
7	None	1,095	.....	1,011	.....	1,158	.....	758	.....	1,684	.....	1,684	.....
8	Phosphated manure, 8 tons; acid phosphate, 200 lb.; muriate potash, 50 lb.; nitrate soda, 50 lb	3,200	2,161	2,232	1,179	2,274	1,193	2,189	1,150	2,695	1,123	2,273	589
9	Phosphated manure, 8 tons; powdered limestone, 2 tons; acid phos.; 200 lbs.; mur. potash, 50 lb.; nitrate soda, 50 lb	3,074	2,092	3,284	2,190	2,895	1,891	3,284	1,965	4,042	2,583	3,242	1,558
10	None	926	.....	1,136	.....	926	.....	1,600	.....	1,347	.....	1,684	.....
	Average unfertilized yield	947	.....	1,126	.....	1,034	.....	1,053	.....	1,453	.....	1,585	.....
	Rotation II: potatoes-wheat-clover	Block R		Block P		4-year average							
1	None	3,032	.....	1,263	.....	1,697	.....						
2	Acid phosphate, 400 lb	3,368	420	1,937	590	2,607	815						
3	Acid phosphate, 400 lb.; muriate potash 200 lb	4,716	1,853	2,526	1,094	3,214	1,327						
4	None	2,779	.....	1,516	.....	1,981	.....						
5	Acid phos., 400 lb.; mur. potash, 200 lb.; nitrate soda, 200 lb.	4,295	1,320	2,189	701	2,902	890						
6	Acid phos., 800 lb.; mur. potash, 400 lb.; nitrate soda, 400 lb.	5,474	2,302	2,189	729	3,095	1,053						
7	None	3,368	.....	1,432	.....	2,073	.....						
8	Untreated manure, 8 tons	7,495	4,183	4,295	3,088	4,555	2,593						
9	Untreated manure, 8 tons; acid phosphate, 200 lb	6,568	3,312	4,042	3,059	4,272	2,422						
10	None	3,200	.....	758	.....	1,739	.....						
	Average unfertilized yield	3,095	.....	1,242	.....	1,874	.....						

THE POTATOES-WHEAT-CLOVER ROTATION

The outcome of this rotation is shown in Tables 40 and 41. The yield of potatoes on the untreated land has been very low, as is to be expected in this latitude and on such an impoverished soil as that under experiment.

Acid phosphate has produced a marked increase in yield, the increase in potatoes alone paying the cost of the phosphate used on both potatoes and wheat, if potatoes be valued at 50 cents a bushel or more.

Muriate of potash has produced a further increase, which has been a profitable one with muriate rated at $150 a ton.

Nitrate of soda has apparently depressed the yield not only of potatoes but of wheat also, a result which is so different from that shown in the other experiments on this farm and elsewhere as to call for a further continuance of the work before attempting to draw any conclusions on this point.

Doubling the dose of fertilizers, on Plot 6, has failed to meet a corresponding response, and the cost of treatment has outrun the value of the increase.

There would seem to be no reason to question the effect of manure, nor of reinforcing the manure with acid phosphate, which has been done in this case, not by mixing the phosphate with the manure, but by applying it separately when planting the potatoes.

The effect on the wheat crop of a preceding potato crop is the usual one of a marked increase in the yield of wheat over that following corn or oats. The 5-year average yield on the manured land of 31 bushels per acre is suggestive of the possibilities of wheat production on Clermont County soil.

THE CORN-SOYBEAN-WHEAT ROTATION

The purpose of this experiment is to study the effect of returning all the crop residues—stover and straw—to the land and of growing catch crops after the corn, and also to compare the effect of acid phosphate and raw phosphate rock under such conditions as this treatment of the land will produce. The results thus far attained are given in Tables 42 and 43. It seems probable that after this first round of liming the quantity of limestone might be reduced to 1 ton per acre for each 3-year period.

TABLE 41.—Fertilizers and manure on POTATOES and WHEAT in potatoes-wheat-clover rotation, Clermont County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918				1919				Average			
		Yield		Increase		Yield		Increase		Yield		Increase	
		Potatoes or wheat	Straw	Potatoes or wheat	Straw	Potatoes or wheat	Straw	Potatoes or wheat	Straw	Potatoes or wheat	Straw	Potatoes or wheat	Straw
	Potatoes	**Block Q**				**Block R**				**6-year average**			
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*
1	None	61.00				45.00				46.28			
2	Acid phosphate, 200 lb	82.67		21.00		46.33		7.11		58.78		11.85	
3	Acid phosphate, 200 lb.; muriate potash, 100 lb	79.33		17.00		44.33		10.88		63.11		15.53	
4	None	63.00				27.67				48.22			
5	Acid phos., 200 lb.; mur. pot., 100 lb.; nit. soda, 100 lb.	76.33		14.00		44.67		18.33		57.72		9.85	
6	Acid phos., 400 lb.; mur. pot., 200 lb.; nit. soda, 200 lb.	96.67		35.00		49.00		24.00		68.33		20.81	
7	None	61.00				23.67				47.17			
8	Untreated manure, 8 tons	118.67		58.23		75.67		52.22		81.83		35.44	
9	Untreated manure, 8 tons; acid phosphate, 200 lb	114.00		54.11		86.67		63.45		88.17		42.56	
10	None	59.33				23.00				44.83			
	Average unfertilized yield	61.08				29.83				46.62			
	Wheat	**Block P**				**Block Q**				**5-year average**			
1	None	15.67	1,860			21.67	2,000			16.40	1,484		
2	Acid phosphate, 200 lb	38.00	2,320	20.44	240	32.67	3,340	11.45	1,380	27.74	2,276	11.23	905
3	Acid phosphate, 200 lb.; muriate potash, 100 lb	47.00	5,780	27.56	3,480	33.67	3,680	12.89	1,760	32.00	3,460	15.38	1,803
4	None	21.33	2,520			20.33	1,880			16.73	1,744		
5	Acid phos., 200 lb.; mur. pot., 100 lb.; nit. soda, 100 lb.	44.33	6,040	22.78	3,600	30.33	2,680	8.67	613	28 93	3,188	11.27	1,389
6	Acid phos., 400 lb.; mur. pot., 200 lb.; nit. soda, 200 lb.	42 67	4,640	20.89	2,280	31.00	3,540	8.00	1,287	29.73	3,204	11.13	1,351
7	None	22.00	2,280			24.33	2,440			19.53	1,908		
8	Manured on potatoes	36.33	4,320	16.55	2,107	31.00	3,240	7.56	913	30.60	3,624	12.16	1,828
9	Manured on potatoes	40.33	4,580	22.78	2,433	30.00	3,800	7.44	1,587	30.93	3,896	13.58	2,212
10	None	15.33	2,080			21.67	2,100			16.27	1,572		
	Average unfertilized yield	18.58	2,185			21.97	2,105			17.22	1,677		

TABLE 42.—Fertilizers and limestone in corn-soybeans-wheat rotation, Clermont County Experiment Farm

Plot	Treatment per acre	1917 Yield Grain	1917 Yield Straw	1917 Increase Grain	1917 Increase Straw	1918 Yield Grain	1918 Yield Straw	1918 Increase Grain	1918 Increase Straw	1919 Yield Grain	1919 Yield Straw	1919 Increase Grain	1919 Increase Straw	Plot No.
	Corn	Block X				Block W				Block V				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	37.41	.....	.....	.....	45.96	.....	.....	.....	22.71	.....	.....	.....	1
2	Acid phosphate, 320 lb.; limestone, 2 tons	49.00	.....	11.95	.....	49.52	.....	2.43	.....	33.50	.....	8.07	.....	2
3	Floats, 1,040 lb.; limestone, 2 tons	43.11	.....	6.41	.....	54.76	.....	6.55	.....	33.78	.....	5.64	.....	3
4	None	36.34	.....	.....	.....	49.34	.....	.....	.....	30.86	.....	.....	.....	4
5	Acid phos., 320 lb.; mur. potash, 50 lb.; limestone 2 tons	42.22	.....	7.42	.....	55.93	.....	9.00	.....	50.57	.....	20.14	.....	5
6	Floats, 1,040 lb.; muriate potash, 100 lb	41.86	.....	8.61	.....	53.09	.....	8.57	.....	53.36	.....	23.36	.....	6
7	None	31.71	.....	.....	.....	42.11	.....	.....	.....	29.57	.....	.....	.....	7
	Average unfertilized yield	35.15	.....	.....	.....	45.80	.....	.....	.....	27.71	.....	.....	.....	
	Soybeans	Block V				Block X				Block W				
1		8.50	1,905	.....	.....	7.11	945	.....	.....	8.68	1,474	.....	.....	1
2		11.50	2,370	2.85	479	6.90	1,232	—.61	373	9.31	1,910	.85	385	2
3		11.00	2,265	2.20	388	7.81	1,027	—.10	255	9.06	2,162	.82	587	3
4	(Fertilized only on corn and wheat)	8.95	1,863	.....	.....	8.31	686	.....	.....	8.02	1,626	.....	.....	4
5		11.00	2,355	2.52	509	9.14	997	1.38	303	9.48	1,925	1.57	288	5
6		12.55	2,457	4.53	628	7.90	898	.70	195	9.06	2,125	1.26	478	6
7		7.55	1,812	.....	.....	6.65	711	.....	.....	7.69	1,658	.....	.....	7
	Average unfertilized yield	8.33	1,860	.....	.....	7.36	781	.....	.....	8.13	1,586	.....	.....	
	Wheat					Block V				Block X				
1	None	.....	.....	.....	.....	10.15	831	.....	.....	14.50	1,230	.....	.....	1
2	Acid phosphate, 200 lb	.....	.....	.....	.....	16.50	1,200	5.77	324	24.12	1,627	9.84	421	2
3		.....	.....	.....	.....	13.60	1,044	2.28	123	19.33	1,577	5.28	396	3
4	None	.....	.....	.....	.....	11.90	966	.....	.....	13.83	1,157	.....	.....	4
5	Acid phosphate, 200 lb.; muriate potash, 50 lb	.....	.....	.....	.....	19.45	1,503	7.77	554	23.87	1,992	9.57	734	5
6		.....	.....	.....	.....	18.50	1,470	7.03	538	19.21	1,610	4.43	251	6
7	None	.....	.....	.....	.....	11.25	915	.....	.....	15.25	1,460	.....	.....	7
	Average unfertilized yield	.....	.....	.....	.....	11.10	904	.....	.....	14.53	1,282	.....	.....	

TABLE 43.—Fertilizers and limestone in corn-soybeans-wheat rotation, Clermont County Experiment Farm. Three-year summary

Plot	Treatment per acre	Yield		Increase		Plot
		Grain	Straw	Grain	Straw	
	Corn: 3-year average					
		Bu.	*Lb.*	*Bu.*	*Lb.*	
1	None	35.36	.....	.....	.....	1
2	Acid phosphate, 320 lb.; limestone, 2 tons	44.01	.....	7.48	.....	2
3	Raw phosphate, 1040 lb.; limestone, 2 tons	43.88	.....	6.20	.....	3
4	None	38.85	.....	.....	.....	4
5	Acid phos. 320 lb.: mur. potash, 50 lb.; limestone, 2 tons	49.57	.....	12.19	.....	5
6	Raw phos., 1,040 lb.; mur. potash, 100 lb.; limestone, 2 tons	49.44	.....	13.51	.....	6
7	None	34.46	.....	.....	.....	7
	Average unfertilized yield	36.22	.....	.....	.....	
	Soybeans: 3-year average					
1		8.10	1,441	.....	.....	1
2		9.24	1,837	1.03	412	2
3		9.29	1,818	.97	410	3
4	(Fertilized only on corn and wheat)	8.43	1,392	.....	.....	4
5		9.21	1,759	1.82	367	5
6		9.84	1,827	2.16	434	6
7		7.30	1,394	.....	.....	7
	Average unfertilized yield	7.94	1,409	.....	.....	
	Wheat: 2-year average					
1	None	12.32	1,030	.....	.....	1
2	Acid phosphate, 200 lb	20.36	1,413	7.80	372	2
3	Fertilized only on corn	16.46	1,310	3.78	259	3
4	None	12.86	1,061	.....	.....	4
5	Acid phosphate, 200 lb.; muriate potash, 50 lb	21.66	1,747	8.67	644	5
6	Fertilized only on corn	18.85	1,540	5.73	394	6
7	None	13.25	1,187	.....	.....	7
	Average unfertilized yield	12.81	1,093	.....	.....	

Financial outcome

	Total treatment for one rotation	Total value of increase	Cost of treatment	Net gain or loss (—)	
2	Acid phosphate, 520 lb.; limestone, 2 tons	$28.33	$19.80	$18.53	2
3	Raw phosphate, 1,040 lb.; limestone, 2 tons	18.70	19.80	—1.10	3
5	Acid phos., 520 lb.; mur. potash, 100 lb.; limestone, 2 tons	37.42	27.30	10.12	5
6	Raw phos., 1,040 lb.; mur. potash 100 lb.; limestone, 2 tons	33.77	27.30	6.47	6

CONCLUSIONS

The outstanding feature of the work in soil fertility on the Clermont County Experiment Farm is that on this impoverished soil drainage, lime, phosphorus, potassium and nitrogen, all five, are necessary, and that no one of these can be omitted without loss in net gain as well as in total yield.

When all these ameliorants have been employed, using manure as the carrier of nitrogen and potassium, on the basis of its cost

as an incidental product of the farm, the cost of the lime and phosphorus and nearly half that of the drainage have been recovered in a single 4-year period.

The average yields on Plot 9 in Rotation I in these experiments have been 50 bushels of corn and 24 bushels of wheat, while the average yields for Clermont County as a whole have been 30 bushels of corn and 13 bushels of wheat. The difference between these yields, at present prices, amounts to more than $20 an acre, or to more than a million dollars for the 50,000 acres annually given to these two crops combined in that county.

Barn and tool house, Clermont County Experiment Farm

That the outcome attained on the experiment farm is certainly within reach of the average Clermont County farmer is shown by the fact that the yields on the untreated land of the experiment farm have been less than 24 bushels of corn and 8 bushels of wheat per acre.

VARIETY AND CULTURAL WORK

DEPARTMENT OF AGRONOMY

CORN

Seven varieties of corn have been tested during the past 7 years. Of those tested the full period the Darke County Mammoth is first in yield, the Leaming second, Orcutt's Reid third and Clarage fourth.

TABLE 44.—Comparison of varieties of CORN, Clermont County

Variety	Yield per acre—bushels							Average yield per acre	
	1913	1914	1915	1916	1917	1918	1919	Grain	Stover
								Bu.	*Lb.**
Leaming	29.83	34.62	34.13	17.36	20.88	22.92	6.33	23.72	1,325
Clarage	28.71	35.70	30.51	19.07	17.78	17.06	4.95	21.97	1,317
White Cap	29.69	26.23	28.75	16.36	13.97	9.39	5.70	18.58	1,312
Cook's 75	28.02	37.47	29.32	19.21	15.11	15.82	7.85	21.83	1,470
Reid Orcutt	29.30	40.72	35.32	17.80	21.43	10.87	10.00	23.63	1,652
Leaming-Cuppy	28.11	37.88	.....	.....	.....	.....	.....	.....	.....
Darke Co. Mammoth	31.74	33.85	35.75	20.79	19.25	19.49	8.28	24.16	1,406
Ohio 84	.....	.....	29.18	20.63	15.49	12.59	5.28	16.63	1,731

*Stover 5-year average. Not cut in 1918 and 1919.

OATS

The variety oat test has included seven varieties. All except one have been tested for 6 seasons. Avraging the several seasons the Big Four is first in yield, Ohio 7009 second, Silver Mine third and Ohio 6203 fourth.

TABLE 45.—Comparison of varieties of OATS, Clermont County Experiment Farm

	Yield per acre—bushels							Average yield per acre	
	1913	1914	1915	1916	1917	1918	1919	Grain	Straw
								Bu.	*Lb.*
Big Four	16.48	16.87	43.35	21.85	40.67	36.51	.....	29.29	1,417
Silver Mine	15.13	16.98	36.90	21.33	40.36	27.84	.....	26.43	1,023
Swedish Select	4.61	10.84	41.48	17.58	38.02	27.76	.....	23.38	1,153
Ohio 7009	.....	23.43	36.43	15.29	39.00	22.60	.....	27.35	742
Ohio 6203	9.40	12.18	44.55	22.37	38.80	31.20	.....	26.42	1,095
Ohio 6222	10.96	6.87	39.12	20.18	37.39	28.23	.....	23.79	1,167
Wideawake	12.11	16.25	36.69	20.08	34.90	28.85	.....	24.81	1,566

WHEAT

Variety test.—Seven varieties of wheat have been tested during the the past 6 years. The Gladden is first in yield, Mediterranean second and Nigger third.

TABLE 46.—Comparison of varieties of WHEAT, Clermont County Experiment Farm

	Yield per acre—bushels						6-year average	
	1914	1915	1916	1917	1918	1919	Grain	Straw
							Bu.	*Lb.*
Nigger	13.74	23.28	13.95	12.28	20.32	.....	16.71	1,422
Mediterranean	14.92	20.61	11.29	8.94	18.23	27.40	16.90	628
Rudy	14.42	15.88	8.70	8.36	13.61	26.61	14.60	1,587
Turkey Red	8.47	11.83	7.28	11.94	.....	20.27	11.96	1,298
Gladden	13.57	21.39	14.61	14.11	19.19	25.27	18.02	1,829
Portage	19.53	18.66	9.03	8.86	16.77	22.11	15.83	1,456
Velvet Chaff	13.58	18.67	10.28	12.78	16.28	25.27	16.14	1,501
Trumbull	.....	.....	7.12	5.11	14.61	17.11	.....	.....
Fulcaster	.....	.....	.....	.....	20.11	.....	.....	.....
Marvelous	.....	.....	.....	.....	.....	27.10	.....	.....

Date of seeding.—A date of seeding test has been conducted for the past 5 seasons. These seedings were begun in September and have been made at intervals of 1 week well through the month of October. The rate of seeding and other conditions have been uniform throughout the season. Averaging the several seasons' work, the seedings made October 5 and 6 have given the largest yield, with October 12 second and September 29 third. The controlling factor in determining the proper date to seed wheat is often the presence or absence of the Hessian fly. The advice of the county agricultural agent should be sought regarding this matter.

TABLE 47.—Date of seeding WHEAT, Clermont County Experiment Farm

Date of seeding	Yield per acre—bushels					Average yield per acre	
	1915	1916	1917	1918	1919	Grain	Straw
						Bu.	*Lb.*
September 1	.....	2.17	*	.....	23.33	12.75	.....
September 8	16.00	2.50	*	.....	29.00	15.83	1,617
September 15	22.50	6.58	11.33	11.33	29.67	16.27	1,424
September 22	13.17	4.83	8.67	20.33	31.33	15.67	1,350
September 29	28.33	6.83	6.33	16.67	29.67	17.57	1,462
October 5 and 6	34.17	13.33	5.00	12.33	26.33	18.23	1,508
October 12	32.17	12.33	4.00	16.00	25.00	17.90	1,596
October 19	.....	5.67	4.33	15.33	26.00	12.83	1,055
October 26 and 28	15.83	5.00	8.67	13.00	13.67	11.23	1,058
November 3	16.33	.....	.....	.....	.....	.....	.....

*No wheat.

Rate of seeding.—Five rates of seeding ranging from 4 to 8 pecks per acre have been compared for 5 seasons. Eight pecks of seed per acre has given the largest net yield (bushels produced less the seed used), with 4 pecks second and 7 pecks third. Only one season (1918) did 4 pecks per acre lead the other rates in yield. While this test is not entirely consistant, with the evidence available, 8 pecks of seed per acre is indicated.

TABLE 48.—Rate of seeding WHEAT, Clermont County Experiment Farm

Number of pecks of seed used per acre	Yield per acre—bushels					Average yield per acre	
	1915	1916	1917	1918	1919	Grain	Straw
						Bu.	*Lb.*
Four	29.83	8.83	7.00	25.33	21.00	18.40	1,406
Five	32.83	12.00	9.33	14.00	18.67	17.37	1,398
Six	31.50	15.50	5.00	18.33	19.33	17.93	1,564
Seven	37.50	12.50	4.00	18.33	23.00	19.07	1,526
Eight	32.38	16.17	9.67	17.67	23.33	19.84	1,568

SOYBEANS

Six varieties of soybeans have been tested for seed production for 5 seasons. The Mongol has given the largest yield, the Ebony second and the Elton third. The yields of all varieties have been very low in this county.

TABLE 49.—Comparison of varieties of SOYBEANS, Clermont County Experiment Farm

Variety	Yield per acre—bushels					Average yield per acre	
	1915	1916	1917	1918	1919	Grain	Straw
						Bu.	*Lb.*
Elton	5.95	7.61	5.21	9.47	7.54	7.16	1,422
Mongol	7.62	10.44	7.60	7.03	8.82	8.30	1,998
Ebony	6.23	3.56	8.21	9.25	10.48	7.55	1,484
Ohio 9100	2.78	4.06	4.88	8.69	8.04	5.69	1,186
Ohio 9035	6.84	4.78	7.21	5.58	4.93	5.87	1,700
Medium Green	7.12	5.67	3.54	8.08	5.54	5.99	1,452
New Era Cowpea	.....	.33	1.50	....	2.33	1.04	2,137

Ten different varieties have been tested two seasons for hay production. Of those tested both seasons the largest yield of hay was given by the Ebony, with the Medium Green second.

TABLE 50.—Comparison of varieties of SOYBEANS for hay, Clermont County Experiment Farm

Variety	Yield of hay		Average
	1918	1919	
	Lb.	*Lb.*	*Lb.*
Medium Green	2,833	3,325	3,079
Ebony	2,833	3,892	3,362
Cowpeas and Soybeans	2,058	.....	.....
Mongol	3,183	2,785	2,970
Mammoth Yellow	2,708	.....	.....
Southern Brown	3,383	.....	....
Southern Black	3,533	.....	....
Ohio 9035	2,283	2,459	2,371
Ohio 9100	.....	4,358	.....
Elton	.....	3,231	.....
New Era Cowpea	.....	1,191	....

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BULLETIN

OF THE

Ohio Agricultural Experiment Station

NUMBER 344 JUNE, 1920

COUNTY EXPERIMENT FARMS IN OHIO

PART IV

THE HAMILTON COUNTY EXPERIMENT FARM

SEVENTH AND EIGHTH ANNUAL REPORTS FOR 1918 AND 1919

CHARLES E. THORNE, DIRECTOR

CARY W. MONTGOMERY, CHIEF

H. W. ROGERS, SUPERINTENDENT
E. W. MOORE, FOREMAN

PERSONNEL

W. J. Smith resigned the superintendency of this farm and was succeeded by H. W. Rogers. Melbourne D. Moore was succeeded as foreman by E. W. Moore, who resigned and was succeeded by C. D. Adams, February 23, 1920.

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment, March 1, 1919

Original Cost: land and buildings		$25,000.00
Permanent Improvements to March 1, 1918		9,080.00
Permanent Improvements made 1918:		
Water system at dairy barn	$ 98.25	
Well pit, ditch, engine house, etc., front house	159.38	
Building bull pen	17.80	
Electric wiring poultry house	6.55	
30 rods tile drain	93.54	
Hog fence and pasture field fence	57.05	
Total improvements 1918		432.57
Total permanent investment		$34,512.57
Operating Equipment:		
Livestock: 8 horses, $1,005; cattle, $975; hogs, $875	$2,855.00	
Machinery, tools and harness	1,605.00	
Crops, feeds, etc.: corn, $350; oats, $75; wheat, $400; hay, $400; silage, $25; straw, $75; potatoes, $50; bran, $50; soybeans, $150	1,575.00	
Seeds: corn, $75; clover, $40; timothy, $10; alsike, $15; alfalfa, $10	150.00	
Fertilizer and limestone	60.00	
Drain tile	50.00	
Containers	50.00	
Sundries: fuel, $6; twine, $5; spray material, $10; lawn seats, $5; bedroom equipment, $55	81.00	
		6,426.00
Total investment		$40,938.57

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1919

Dr.

To Receipts

In hands of Superintendent for payment of small bills		$ 58.10
From County maintenance fund distribution		2,000.00
From Farm Sales:		
Livestock: hogs, $1,863.86; cattle and products, $210.62; calves and hides, $55; fees, $3; butterfat, $802.82; milk, $30.70; poultry, $64.02; eggs, $138.79	$3,168.81	
Crops and seeds: corn, $10; oats, $11.87; soybeans, $144.05; potatoes, $123.92; wheat, $1,680.71; hay, $374.20; fodder, $11.46; straw, $12.66; sweet corn, $5; apples, $47.35; cabbage, $6.05; cucumbers, 80 cents; seeds, $28.40	2,456.47	
Sundries: containers, $12.50; fertilizer, $5.50; scale-drafts, $7.89; junk, $1.57; implements, $16; miscellaneous, $25.17	70.15	
		5,693.92
Total receipts		$7,752.02

Dr.

By Expenditures

For Labor	$3,190.08	
For Current Expenses: seeds, $839.69; feeds, $1,047.76; fertilizer, $232; spray material, $28.95; binding material, $52.35; plot fixtures, $5.50; containers, $18.40; machine hire, threshing, etc., $93.82; livestock equipment, $29.27; horse shoeing, $35.15; veterinary services, $68.90; livestock fees, $7.50; incidentals, $24.55; fence repair, $7.90; building maintenance, $30.97; water supply maintenance, $116.55; drainage maintenance, $20.25; implement maintnance, $140.53; engine maintenance, $96.49; office supplies, $30.91; transportation, $49.12; communication, $113.07; publicity, $6.10; painting, $3.50; fuel, $19.74; bed springs and mattress, $18; miscellaneous, hardware, $21.23	3,158.24	
For Permanent Improvements: building, $163.54; concrete masonry, $17; water supply, $30.51; fence, $50.15; ornamental planting, $14.14	275.34	
For machinery, tools and harness	386.35	
For Livestock: horses, $563.60; cattle, $115; poultry, 75 cents; hogs, $20	699.35	
Total expense		$7,709.36
In hands of Superintendent for payment of small bills		25.00
Returned to county treasury		17.66
		$7,752.02

CROP AND LABOR STATISTICS, 1918

Area of farm, 223.35 acres
Area of farmstead, 9.17 acres
Area cultivated, 117.12 acres
Orchard, 14.22 acres
Permanent pasture, 39.25 acres
Woodland, 27.25 acres
Roads (public), 5 acres
Roads and alleys, (farm) 7.01 acres
Waste 4.33 acres

Plot Work	No. of plots	Total a rea	Total yield	Yield per acre
		Acres	*Pounds*	
Corn	26	2.6	11,270	61.92 bu.
Oats	13	1.3	2,424	58.27 bu.
Soybeans	25	2.5	2,645	17.63 bu.
Cowpeas	1	.1	5	.83 bu.
Potatoes	13	.65	2,283	58.54 bu.
Wheat	47	3.65	6,149	28.08 bu.
Hay (timothy & clover)	26	2.25	10,365	2.3 tons
Hay (alfalfa)	9	.67	7,500	5.62 tons
Total plots and plot acres	160	13.72		
Field Work				
Corn (husked)		15.	52,500	50 bu.
Corn (silage)		9.	155,050	8.61 tons
Corn (hogged down)		1.	5,040	72 bu.
Oats		10.5	17,968	53.48 bu.
Soybeans		10.	8,235	13.73 bu.
Soybeans		5	Not threshed	
Potatoes		2	8,400	70. bu.
Sweetcorn		1.2	Silage, 14,000*	Ears 100 doz.
Wheat		23.6	44,580	30.07 bu.
Hay (clover and timothy)		23.5	134,000	2.85 tons
Hay (alfalfa)		.65	Failed to catch	
Hay (soybean)		1.	4,020	2.01 tons
Hay (oats and peas)		1.25	No report	
Total field acres		103.7		
Total crop acres		117.42		
Less alleys cut for hay		.30		
Total cultivated area		117.12		

						Hay	
	Corn bu.	Oats bu.	Soybn's bu.	Potatos bu.	Wheat bu.	Clo. & tim. tons	Alfalfa tons
Highest yielding plots per acre	77.86	76.25	26.17	103.	51.66	3.5	6.9
Lowest yielding plots per acre	35.71	35.94	11.	24.	10.66	2.	5.175

Number of work horses used on Hamilton County Experiment Farm in 1918 6
Number of crop acres per work horse 21.89
Number of man hours per year (March 1, 1918 to February 28, 1919, inclusive) 17,057
Number of horse hours per year (March 1, 1918, to February 28, 1919, inclusive) 7,020

*Estimated.

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment, March 1, 1920

Original Cost: land and buildings		$25,000.00
Permanent Improvements to March 1, 1919		9,512.57
Permanent Improvements made 1919:		
Addition to barns	$190.42	
Concrete for scales and floor in horse barn	93.39	
Plank, etc., for wagon scales	31.12	
Fences	110.95	
Permanent plantings	17.90	
Total improvements 1919		443.78
Total permanent investment		$34,956.35
Operating Equipment:		
Livestock: 6 horses and 2 colts, $1,225; cattle, $1,535; hogs, $655	$3,415.00	
Machinery, tools and harness	3,014.00	
Crops, feeds, etc.: corn, $450; oats, $135; wheat, $1,000; hay, $200; straw, $90; soybeans, $250; silage, $300; potatoes, $450; mill feed, tankage, bran, $391	3,266.00	
Seeds: corn, $25; clover, $175	200.00	
Fertilizer and limestone	155.00	
Cement and gravel, $105; lumber, $250	355.00	
Fence material: posts, $50; wire, $100	150.00	
Sundries: containers, $29; coal, $4; oil, $1; twine, $18; spray material, $55; paint, $60; lawn seats, $2; office stove, $20; roofing, $40; salt, $7	236.00	
Bedroom equipment	40.00	
Total		10,831.00
Total investment		$45,787.35

RECEIPTS AND EXPENDITURES

For the year ending February 28,1920

Dr.

To Receipts

From County		$2,000.00
From Farm Sales:		
Livestock and products: hogs, $2,287.69; calves and hides, $167.45; fees, $9; butterfat, $973.46; milk, $3.08	$3,440.68	
Crops and seeds: corn, $2.50; oats, $46.17; wheat, $1,158.67; potatoes, $144.33; soybeans, $362.30; tomatoes, $4; hay, $652.88; straw, $68.62; apples, $220.63; grapes, $2; seeds, $24.46	2,686.56	
Sundries: containers, $1; communication, $1.05; gasoline, $1.19; labor, $1.85; scale drafts, $3.10	8.19	
		6,135.43
Total receipts		$8,135.43
Held by Superintendent for payment of small bills		58.10
Returned to County Treasury		17.66
		$8,211.19

Cr.

By Expenditures

For Labor		$3,007.15
For Current Expenses: seeds, $411.46; feeds, $695.22; livestock equipment, $53.50; horse shoeing, $12.50; veterinary, $29.12; fees, $5; livestock incidentals, $17.41; building renewal and repairs, $278.01; water supply maintenance, 31 cents; fence maintenance, $1.17; implement maintenance, $137.94; engine maintenance, $163.39; fertilizer, $361.34; spray material, $40.05; binding material, $49.50; containers, $5; machine hire, $175.60; transportation, $15.22; communication, $64.90; publicity, $17.12; office supplies, $7.05; fuel and light, $26.28; miscellaneous hardware, $14.86; scale drafts, $1.50; stove for office, $25.15	2,608.60	
For Permanent Improvements: building, $190.42; concrete and masonry, $93.39; fence, $110.95; permanent planting, $17.90	412.66	
For machinery, tools and harness	1,606.80	
Livestock: cattle	412.21	
Installing wagon scales	31.12	
Total expense		$8,078.54
Held by Superintendent for the payment of small bills		122.00
Returned to County Treasury		10.65
		$8,211.19

CROP AND LABOR STATISTICS, 1919

Area of Farm, 223.35 acres
Area in Farmstead, 2.22 acres
Area cultivated, 119.92 acres
Orchard, 16.01 acres
Permanent pasture, 39.63 acres
Woodlot, 27.25 acres
Roads (public), 7.44 acres
Roads and alleys (farm), 6.55 acres
Waste, 4.33 acres

PLOT WORK	No. of plots	Total area	Total yield	Yield per acre
		Acres	*Pounds*	
Corn	26	2.6	11,533	63.37 bu.
Oats	11	1.1	691	19.63 bu.
Barley	1	.1	6	1.25 bu.
Soybeans	25	2.5	2,886	19.24 bu.
Cowpeas	1	.1	14	2.33 bu.
Potatoes	37	2.81	12,961	76.88 bu.
Wheat (winter)	47	3.74	5,621	25.05 bu.
Wheat (spring)	1	.1	8	1.33 bu.
Hay (clover and timothy)	13	1.5	4,470	1.49 tons
Hay (alfalfa)	9	.77	5,140	3.34 tons
Hay (soybean)	13	.75	4,550	3.03 tons
Total plots and plot acres	184	16.07		

FIELD WORK			
Corn (husked)	11.75	47,250	57.45 bu.
Corn (silage)	9.75	137,240	7.04 tons
Corn (hogged off)	1.	3,437	49.1 bu.
Soybean hay		3,341	1.67 tons
Oats	20.29	19,776	30.46 bu.
Soybeans	1.5	1,785	19.83 bu.
Potatoes	.5	2,637	87.9 bu.
Wheat	31.28	37,380	19.92 bu.
Hay (clover and timothy)	24.68	74,000*	1.5 tons
Hay (alfalfa)	1.25	2,000	.8 tons
Hay (soybean)	1.	3,120	1.56 tons
Hay (peas and oats)	.75	2,220	1.48 tons
Forage (soybeans variety orchard)	4.	12,000	1.5 tons
Cabbage	.5		Taken by grasshoppers
Total field acres	108.25		
Total crop acres	124.32		
Less alleys cut for hay	.40		
Less soybeans for orchard	4.		
Total cultivated area	119.92		
Orchard (new)	4.74		9.7
Orchard (old)	11.27		2.04
Total orchard	16.01		

						Hay		
	Corn bu.	Oats bu.	Soyb'ns bu.	Potat's bu.	Wheat bu.	Clover & tim. bu.	Alfalfa tons	Soyb'ns tons
Highest yielding plots per acre	85.86	26.56	25.83	117.	41.33	2.16	4.33	3.99
Lowest yielding plots per acre	36.29	9.37	13.67	62.33	14.17	.84	3.27	2.45

Number of work horses used on Hamilton County Experiment Farm 6
Number of crop acres per work horse 22.65
Number man hours per year (March 1, 1919, to February 29, 1920, inclusive) 11,446
Number horse hours per year (March 1, 1919, to February 29, 1920, inclusive) 6,043
Number of tractor hours (March 1, 1919 to February 29, 1920, inclusive) 183.5

*Estimated

WORK OF THE YEAR 1918-19

H. W. ROGERS

The termination of the 1919 farm year marks the end of a very successful year's work added to the successive years the Hamilton County Experiment Farm has been carrying on experimental work.

Founded with the idea, "To demonstrate the practical application under local conditions of the results of the investigations of the Ohio Agricultural Experiment Station and to increase the effectiveness of the agriculture of the various counties of the State," we are sure the addition of each year's work is more thoroughly establishing the real purpose of the farm and is benefitting the agricultural conditions of the county.

The problems encountered on the Hamilton County Experiment Farm are very similar to those found on many of the farms in the county. A number of these problems are given atention on the county experiment farm, namely: rotations, soil fertility, drainage, lime applications, crop varieties, orchard work, methods of cultivating and harvesting crops, combating plant diseases and insect pests, care and feeding of livestock, and cost accounting of farm operations.

Conclusions in relation to these problems cannot be drawn from mere observations or from a period of short duration. Statements and results can be verified only by time.

Our work is definitely planned and conducted on this basis of research, namely: to be constantly on the lookout for features that influence for the better or worse, and not to make any definite statements unless well founded, tested and proved out.

Constant effort is made to secure accuracy in experimental work, and strict attention is given to the smaller details that might seem at first insignificant but sometimes lead to valuable information on the crop with which we are dealing.

FARM CROPS

The 1919 yield of Boone County White corn under identical conditions made almost double that from an adjoining plot of Darke County Mammoth. Owing to the late season there was no difficulty in its maturing.

We are expecting to give the Boone County White variety a test for silage corn, assuming that it will sufficiently mature and at the same time make a greater volume of grain and stover for filling the silo.

Attention has been given soybeans for both hay and seed production. If cut for forage they are managed very similarly to clover hay when harvested. They, perhaps, are a little more difficult to cure, but if properly handled will make an excellent feed.

A forage test was made in drilling the beans solid with the grain drill against drilling in rows 28 inches apart and cultivating. There may be some advantage in either method which would depend upon circumstances from year to year, such as cost of seed, labor available, control of weeds, etc. The 1919 yield for each section was: Solid—2,760 pounds per acre. Rows—3,840 pounds per acre.

In raising the beans for seed care should be taken to prevent excessive loss by shattering. We were very successful in harvesting the beans this season with a grain binder, binding the beans in small sheaves, setting two to four in a place and allowing them to dry a few days before threshing. The threshing was done with the regular grain separator by removing some of the teeth from the concave to prevent splitting of the beans. The speed of he cylinder was also reduced.

TRUCK CROPS

Due to the shortage of labor, truck crops have been taken up only in a limited way. A rotation is in progress consisting of roasting ears, potatoes, cabbage, testing a cover crop versus manure, with like applications of commercial fertilizers to each division.

The manure section receives an application of 10 tons of manure annually, the cover section a cover crop plowed down each season.

For several seasons the grasshoppers have been a drawback to the successful growing of cabbage. The poison bait method of controlling them was tried out the past year in a small way, with indications that it might be used on a larger scale to successfully combat their destructive work.

FIELD WORK

A 4-year rotation of corn, oats, wheat and clover is in operation. It is planned to supplement this with a 3-year rotation of corn, wheat or oats, clover.

An accurate cost account of the 1919 wheat crop was kept to determine the cost of producing 1 acre of wheat by different methods of preparing the seed bed.

The cost per acre given below includes the labor, twine, seed, threshing and percent of fertilizer and lime charged to this crop in the rotation.

Method of preparing seed bed	Cost of production per acre	Yield per acre
	Dollars	*Bushels*
Clover sod, plowed	29.41	26.00
Oats stubble, plowed	25.95	25.75
Oats stubble, disked	20.54	18.33
Corn stubble, disked	19.84	28.00
Soybean stubble, disked	16.88	23.00

The comparatively low cost of producing wheat on soybean stubble is due in the main part to the loose condition of the seed bed following the growth of beans. In the case of corn stubble the ground is compact and requires more disking. Oats stubble demands still more disking in preparation for wheat sowing.

A factor in decreasing the yield of wheat on the clover sod plowed was the favorable season for an excessive growth of straw, causing portions of the field to lodge before harvesting. The growth of young clover in the wheat was also very seriously damaged.

In the other methods of seed bed preparation the wheat stood up, causing no loss or difficulty in harvesting, as well as securing a good stand of clover for the following crop in the rotation.

PASTURE EXPERIMENTS

Sixteen permanent pasture plots were laid out in 1914 to determine profitable methods of pasture improvement. Applications of fertilizers, lime and manure have been made every 2 years and the results observed.

An improvement has been noticed on the plowed and disked plots that were seeded and treated with limestone and complete fertilizer. The plots receiving manure, phosphate and lime have also shown some improvement.

ORCHARD WORK

Another essential part of the farm's work is the orchards that are coming to maturity. The apple orchards are divided into fertility and variety divisions. The fertility work is sub-divided into sod mulch and cover crop sections. The mulch section continuously in grass, is mowed and the trees are mulched with the grass. The cover crop section is broadcasted to soybeans each season, which are chopped into the land with a disk harrow when mature.

The variety orchard is cared for by the cultivated cover crop method. The 1919 soybean cover crop was cut for green forage and fed to the dairy herd to relieve the pasture shortage during the summer drouth.

An old orchard near the front of the farm is being properly pruned and a spraying program planned to combat the blotch and other diseases which have seriously attacked many of the old trees.

A complete cost account has been kept for the fertility and variety orchards since they were set out in 1913.

DAIRY AND HOGS

The livestock on the farm consists mainly of the dairy and hog work carried on at the large barn and hog sheds located near the middle of the farm.

Grade Jersey cows were purchased and have been bred to a purebred sire in building up the herd. Some very promising grade heifers are coming on and at the same time as opportunity permits we are adding some registered Jersey heifers. During the past year four such heifers have been purchased from two herds.

By butterfat test, milk production records, and feed consumed the low producers are located and are taken from the herd. The butterfat is separated from the milk and placed on the Cincinnati market.

DAIRY SUMMARY FOR HAMILTON COUNTY EXPERIMENT FARM

March 1, 1918 to February 28, 1919

DEBITS		CREDITS	
Item	Value	Item	Value
Inventory March 1, 1918:		Inventory February 28, 1919:	
Land and dairy barn	$2,800.00	Land and dairy barn	$2,700.00
Milk house	130.00	Milk house	125.00
Equipment	225.00	Equipment	265 00
Livestock	1,304 00	Livestock	975.00
	$4,459.00		$4,065.00
Man labor, 1,966.5 hrs. at 25c	491.62		
Horse labor, 103.5 hrs. at 15c	15.53	Cream sold, 1,565.4 lbs. B. F.	840.46
Fees	7.50	Milk used, 2,566 lbs.	78.22
Livestock purchases	115.00	Skimmilk fed to calves, 4,436 lbs.	28 84
Feeds	1,193.85	Skimmilk fed to hogs, 23,195 lbs.	150 14
Equipment, purchases and expenses	97.95	Livestock sold	289.62
Interest on average of inventory $4,262 at 6%	255.72	Manure produced*	298.45
		To balance (loss)	885.44
	$6,636.17		$6,636.17

Prices: Grain mixtures, $3.20 per 100 pounds; hays, $1.05 per 100 pounds; pasture per cow, $2.50 per month; average price of butterfat, 0.537 per pound; silage, 0.30 per 100 pounds.

*4.72 tons at $3.47 per ton, 6 months in barn; 4.72 tons at $1.74 on pasture, per cow. Average labor cost, $47 per cow; average feed cost, $103 per cow.

The hogs were added for the consumption of the dairy by-product and also for feeding of surplus corn raised on the farm.

DAIRY SUMMARY FOR HAMILTON COUNTY EXPERIMENT FARM

March 1, 1919 to February 29, 1920

DEBITS		CREDITS	
Item	Value	Item	Value
Inventory March 1, 1919:		Inventory February 29, 1920:	
Land and dairy barn	$2,700.00	Land and dairy barn	$2,450.00
Milk house	125.00	Milk house	112.50
Equipment	265.00	Equipment	243.00
Livestock	975.00	Livestock	1,535.00
	$4,065.00		$4,340.50
Man labor, 1,942.5 hrs. at 25c	485.54	Livestock sold	146.52
Horse labor, 25.5 hrs. at 15c	3.83	Cream sold, 1,753.7 lbs. B. F.	1,165.27
Fees	13.00	Milk used on farm, 1,800 lbs.	74 46
Livestock purchased	405.00	Milk fed to calves, 4,632 lbs.	190.34
Feeds consumed	1,116.82	Skimmilk fed to calves, 5,946 lbs.	38.65
Equipment, purchases and expenses	54.35	Skimmilk fed to hogs, 27,526 lbs.	178 89
Interest on investment, $4,203 at 6%	252.18	Manure produced*	337.50
To balance (gain)	76.41		
	$6,472.13		$6,472.13

Prices: Corn, $2.27 per 100 pounds; oats, $2.45 per 100 pounds; cottonseed meal, $3.88 per 100 pounds; silage, 33 cents per 100 pounds; clover hay, $1.34 per 100 pounds; soybean hay, 67 cents per 100 pounds; pasture (average 5 months), $1.50 per month; straw, 37 cents per 100 pounds; butterfat per pound, average price for year, 66 4 cents per pound.

$4.72 tons at $3.47 per ton, 6 months in barn; 4 72 tons at $1.74 on pasture, per cow. Average labor cost, $40.28 per cow; average feed cost, $79.77 per cow.

A test is made of growing corn continuously to be hogged down. A rye cover crop is turned under and 320 pounds of acid phosphate added each year. Soybeans and rape are sown with the corn.

The results per acre of the 1919 hogging down test were that 22 hogs were kept 23 days on 1 acre of corn with 150 pounds of tankage, costing $7.87, additional. They gained 600 pounds which brought $99, leaving $91.13 as the value of the acre of corn, the yield of which was estimated at 49 bushels.

The aim is to keep four brood sows and finish for the market the litters they raise. The tables following give briefly a summary of the hog work for 1918 and 1919.

HOG SUMMARY FOR HAMILTON COUNTY EXPERIMENT FARM

March 1, 1918 to February 28, 1919

DEBITS		CREDITS	
Item	Value	Item	Value
Inventory March 1, 1918:		Inventory February 28, 1919:	
Livestock	$1,140.00	Livestock	$ 885.00
Land and equipment	363.00	Land and equipment	346.00
	$1,503.00		$1,231.00
Livestock purchased	20.00	Livestock sold	2,168.53
Man labor, 600 hrs	150.00	Service fees	4.00
Horse labor, 109 hrs	16.35	To balance (loss)	309.88
Feed	1,900.36		
Miscellaneous expenses	41.68		
Interest on investment, average inventory, $1,367 at 6%	82.02		
	$3,713.41		$3,713.41

Average prices for year: Corn (ear) $1.89 per 100 pounds; tankage, $4.85 per 100 pounds; middlings, $2.33 per 100 pounds; soybean meal, $3.35 per 100 pounds; skimmilk, 65 cents per 100 pounds; man labor, 25 cents per hour; horse labor, 15 cents per hour; average selling price of hogs, $17.43 per 100 pounds.

HOG SUMMARY FOR HAMILTON COUNTY EXPERIMENT FARM

March 1, 1919 to February 29, 1920

DEBITS		CREDITS	
Item	Value	Item	Value
Inventory March 1, 1919:		Inventory February 29, 1920:	
Livestock	$ 885.00	Livestock	$ 655.00
Land and equipment	346.00	Land and equipment	337.00
	$1,231.00		$ 992.00
Man labor, 533.5 hours	141.95	Livestock sold	2,020.63
Horse labor, 39 hours	5.85	Service fees	13.00
Feed	1,261.82		
Miscellaneous expenses	17.63		
Interest on investment of average inventory, $1,112 at 6%	66.72		
To balance (gain)	300.66		
	$3,025.63		$3,025.63

Average prices for year: Corn (ear) $2.05 per 100 pounds; tankage, $5.04 per 100 pounds; middlings, $3.15 per 100 pounds; bran, $2.50 per 100 pounds; soybeans, $2.12 per 100 pounds; skimmilk, 65 cents per 100 pounds; man labor, 26.6 cents per hour; horse labor, 15 cents per hour; average selling price of hogs, $16.80 per 100 pounds.

EQUIPMENT

Labor-saving devices and equipment are added as conditions and requirements demand for the efficient operation of the farm. The recent addition of tractor power for use in field and belt work has very much increased the rapidity of farm operation. A power spraying outfit just purchased is expected to further increase the effectiveness for the proper management of the orchards. Other minor improvements all help to carry on the work more efficiently.

PERMANENT IMPROVEMENTS

The permanent improvements made during the past year include a 5-ton wagon scale installed at the dairy at a cost of $206.38; remodeling of horse barn to aid in the feeding arrangement for the horses and to provide a shed for workshop and small tools. A number of shade trees were started in the grove; also more plantings and shrubbery were started about the farmstead.

Some line fences were put up at a cost of $110.95; more hog lots were built and repairs were made in the maintenance of farm buildings and equipment.

FIELD MEETINGS AND FAIR EXHIBIT

Annually a field meeting is held on the farm that is given over to an inspection of the work and discussions of agricultural topics.

An experiment farm exhibit is made each year at the Hamilton County Fair at Carthage.

EXPERIMENTS IN THE MAINTENANCE OF SOIL FERTILITY

DEPARTMENT OF SOILS

Two rotations are in progress on this farm; namely:

Rotation I: Corn, soybeans, wheat, clover.
Rotation II: Potatoes, wheat, clover.

The plan of fertilizing in these rotations is shown in Tables 51 and 56.

TABLE 51.—Plan of fertilizing in corn-soybeans-wheat-clover rotation, Hamilton County Experiment Farm

Plot	Treatment	Total cost per acre	Pounds per acre on		
			Corn	Soybeans	Wheat
1	None				
2	Acid phosphate	$ 3.75	200	100	200
3	Acid phosphate Muriate potash	6.00	200 50	100 20	200 20
4	None				
5	Acid phosphate Muriate potash Nitrate soda	10.00	200 50 50	100 20 30	200 20 80
6	Yard manure, untreated		5 tons		5 tons
7	None				
8	Shed manure, untreated		5 tons		5 tons
9	Shed manure, phosphated		5 tons		5 tons
10	None				
11	Shed manure, phosphated Ground limestone		5 tons 2 tons		5 tons
12	Shed manure, phosphated Ground limestone Acid phosphate Muriate potash Nitrate soda		5 tons 2 tons		200 50 50
13	None				

Note.—The fertilizers, including the nitrate of soda, to be applied just before planting the crop. The manure to be plowed under for corn, but applied as a top dressing for wheat. The "phosphated" manure to be treated with 40 pounds of acid phosphate per ton of manure, the phosphate to be mixed with the manure before spreading.

FERTILIZERS AND MANURE ON CROPS GROWN IN ROTATION

ROTATION I: CORN-SOYBEANS-WHEAT-CLOVER

The data for this experiment for 1918 and 1919 and the average results for the 7 years since the work was begun are given in the tables following.

At the valuations here employed the addition of potash to the fertilizer has added both to the total yield and to the net gain. Nitrogen has not produced any further increase, and has therefore been used at a loss. The increase from stall or fresh manure has been much greater than that from yard manure, but the reinforcement of the manure with acid phosphate has not produced sufficient increase to cover the additional cost.

TABLE 52.—Fertilizers, manure and lime on CORN grown in rotation with soybeans, wheat and clover, Hamilton County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on corn	1918—Block A				1919—Block B				7-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	35.71	1,800	.....	.....	48.14	2,250	.....	.....	39.58	2,469	.....	.....	1
2	Acid phosphate, 200 lb	47.14	1,800	8.33	—33	48.71	2,470	1.52	197	44.97	2,536	4.24	58	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb	64.29	2,450	22.39	583	64.14	2,760	17.90	463	54.43	2,649	12.56	161	3
4	None	45.00	1,900	.....	.....	45.29	2,320	.....	.....	43.01	2,496	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 50 lb.; nit. soda, 50 lb	62.14	2,200	16.19	417	60.00	2,810	12.71	547	52.89	2,748	9.42	292	5
6	Yard manure, untreated, 5 tons	60.00	2,100	13.09	433	66.43	2,780	17.14	573	54.44	2,796	10.52	381	6
7	None	47.86	1,550	.....	.....	51.29	2,150	.....	.....	44.38	2,375	.....	.....	7
8	Shed manure, untreated, 5 tons	72.14	2,250	25.00	583	71.71	3,380	19.33	970	60.28	2,977	15.65	579	8
9	Shed manure, phosphated, 5 tons*	67.14	2,450	20.71	667	70.57	3,400	17.09	730	59.68	3,005	14.78	579	9
10	None	45.71	1,900	.....	.....	54.57	2,930	.....	.....	45.16	2,444	.....	.....	10
11	Shed manure, phosphated, ground limestone, 2 tons	73.57	3,050	30.00	1,150	82.00	4,120	33.52	1,463	61.00	3,278	19.65	945	11
12	Shed manure, phosphated, ground limestone, 2 tons	72.86	2,900	31.43	1,000	64.86	3,200	22.48	817	57.04	3,079	19.50	858	12
13	None	39.29	1,900	.....	.....	36.29	2,110	.....	.....	33.74	2,109	.....	.....	13
	Average unfertilized yield	42.71	1,810	.....	.....	47.12	2,352	.....	.....	41.17	2,379	.....	.....	

*40 lb. acid phosphate per ton of manure.

TABLE 53.—Fertilizers, manure and lime on SOYBEANS grown in rotation with corn, wheat and clover, Hamilton County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on soybeans	1918—Block D				1919—Block A				6-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	13.67	2,130	.....	.....	16.17	1,280	.....	.....	11.04	1,624	.....	.....	1
2	Acid phosphate, 100 lb	18.00	2,820	4.55	627	19.67	1,570	3.33	333	13.06	1,758	1.75	195	2
3	Acid phosphate, 100 lb.; muriate potash, 20 lb	18.67	2,280	5.45	23	20.50	1,470	4.00	277	14.14	1,718	2.57	217	3
4	None	13.00	2,320	.....	.....	16.67	1,150	.....	.....	11.83	1,440	.....	.....	4
5	Acid phos., 100 lb.; mur. potash, 20 lb.; nit. soda, 30 lb.	15.67	2,460	2.34	293	21.67	1,600	4.22	430	14.24	1,712	2.20	265	5
6	Yard manure on corn	15.00	2,100	1.33	87	19.83	1,360	1.61	170	13.35	1,516	1.11	61	6
7	None	14.00	1,860	.....	.....	19.00	1,210	.....	.....	12.43	1,462	.....	.....	7
8	Shed manure on corn	14.33	2,640	.22	820	20.83	1,400	2.05	177	13.59	1,912	1.30	440	8
9	Shed manure, phosphated, on corn	19.00	2,360	4.78	580	20.17	1,590	1.62	353	14.43	1,759	2.30	279	9
10	None	14.33	1,740	.....	.....	18.33	1,250	.....	.....	11.99	1,489	.....	.....	10
11	Shed manure, phosphated, and limestone on corn	16.67	1,450	3.45	—123	21.83	1,790	4.11	553	13.94	1,588	2.49	181	11
12	Shed manure and limestone on corn, fertilizers on wheat	16.17	2,180	4.06	773	21.17	1,330	4.06	107	12.64	1,592	1.73	266	12
13	None	11.00	1,240	.....	.....	16.50	1,210	.....	.....	10.37	1,244	.....	.....	13
	Average unfertilized yield	13.20	1,860	.....	.....	17.33	1,220	.....	.....	11.53	1,452	.....	.....	

TABLE 54.—Fertilizers, manure and lime on WHEAT grown in rotation with corn, soybeans and clover, Hamilton County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on wheat	1918—Block C				1919—Block D				6-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	10.67	1,210	.....	.....	14.17	1,870	.....	.....	13.08	1,445	.....	.....	1
2	Acid phosphate, 200 lb	14.83	1,410	3.49	157	22.67	3,020	8.06	1,117	21.33	2,067	7.63	606	2
3	Acid phosphate, 200 lb.; muriate potash, 20 lb	17.33	1,610	5.33	313	19.00	2,060	3.94	123	22.47	2,114	8.16	636	3
4	None	12.67	1,340	.....	.....	15.50	1,970	.....	.....	14.93	1,496	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 20 lb.; nit. soda, 80 lb	20.67	1,860	8.11	613	24.67	2,690	8.34	770	24.97	2,376	9.33	800	5
6	Yard manure, untreated, 5 tons	17.83	1,580	5.39	427	21.00	2,720	3.83	850	20.69	2,247	4.34	592	6
7	None	12.33	1,060	.....	.....	18.00	1,820	.....	.....	17.07	1,734	.....	.....	7
8	Shed manure, untreated, 5 tons	20.83	1,400	8.33	300	19.67	2,220	1.61	103	21.74	2,287	5.09	564	8
9	Shed manure, phosphated, 5 tons	21.17	1,880	8.51	740	20.50	2,630	2.39	217	24.17	2,556	7.95	843	9
11	None	12.83	1,180	.....	.....	18.17	2,710	.....	.....	15.79	1,702	.....	.....	10
12	Shed manure, phosphated, 5 tons	22.67	2,240	9.67	1,087	24.33	3,540	6.66	967	23.10	2,797	9.53	1,172	11
13	Acid phos., 200 lb.; mur. potash, 50 lb.; nit. soda, 50 lb. (Phosphated manure and limestone on corn)	29.17	2,350	16.01	1,223	25.83	4,950	8.66	1,513	27.54	2,847	12.88	1,299	12
14	None	13.33	1,100	.....	.....	16.67	2,300	.....	.....	14.02	1,519	.....	.....	13
	Average unfertilized yield	12.37	1,178	.....	.....	16.50	2,134	.....	.....	15.00	1,573	.....	.....	

TABLE 55.—Residual effect of fertilizers, manure and lime on CLOVER grown in rotation with corn, wheat and soybeans, and financial outcome for entire rotation, Hamilton County Experiment Farm. Yield and increase per acre

Plot	Total fertilizing materials applied to previous crops of rotation	1918 Block B		1919 Block C		5-year average		Financial outcome for entire rotation					Plot
		Yield	Increase	Yield	Increase	Yield	Increase	Value of increase	Cost of treatment: Fertilizers	Cost of treatment: Harvesting	Cost of treatment: Total	Net gain	
		Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*						
1	None	3,644		2,551		3,247							1
2	Acid phosphate, 500 lb.	4,444	622	2,681	173	3,629	317	$29.83	$ 7.50	3.72	11.22	$18.61	2
3	Acid phosphate, 500 lb.; muriate potash, 90 lb.	4,933	933	2,854	389	3,925	546	44.29	14.25	6.37	20.62	23.67	3
4	None	4,178		2,422		3,445							4
5	Acid phos., 500 lb.; mur. potash, 90 lb.; nit. soda, 160 lb.	4,089	—30	3,070	735	4,008	554	43.57	22.25	5.79	28.04	15.53	5
6	Yard manure, untreated, 10 tons	5,733	1,674	3,459	1,210	4,536	1,074	35.86	10.00	5.06	15.06	20.80	6
7	None	4,000		2,162		3,470							7
8	Shed manure, untreated, 10 tons	6,000	2,074	3,632	1,297	4,948	1,402	40.66	10.00	6.91	16.91	31.75	8
9	Shed manure, phosphated, 10 tons*	5,333	1,481	4,151	1,643	4,471	850	50.76	16.00	7.11	23.11	27.65	9
10	None	3,778		2,681		3,696							10
11	Shed manure, phosphated, 10 T.; ground limestone, 2 T.	5,956	2,252	4,324	1,975	4,811	1,269	65.12	22.00	7.19	31.19	33.93	11
12	Shed manure, phosphated, 5 T.; ground limestone, 2 T.; acid phos.; 200 lb.; mur. potash, 50 lb.; nit. soda, 50 lb.	5,156	1,526	2,984	966	4,072	683	63.72	29.75	7.21	38.96	24.76	12
13	None	3,556		1,686		3,235							13
	Average unfertilized yield	3,831		2,300		3,418							

*40 lbs. acid phosphate per ton of manure.

The largest gain, however, both total and net, has come from the use of phosphated manure followed by ground limestone; the total yield being more than twice as great and the net gain nearly twice as great from this treatment, estimated to cost $22 for each 4-year period, or $5.50 annually, as from acid phosphate used alone at a cost of $7.50 for this period, or $1.87 annually.

It should be remembered that this outcome has been reached on drained land. The experiments on the Clermont County farm are showing that on the soils of this region drainage is essential to the full effect of fertilizing or manuring.

In respect to need for drainage the soils of the Clermont and Hamilton County experiment farms were very similar, although that of the Hamilton County farm had not been so completely depleted of fertility as the Clermont soil.

THE POTATOES-WHEAT-CLOVER ROTATION

The plan of this experiment is shown in Table 56. The beginning of the test was delayed until 1913, in order to drain the land, and the work on Plots 11, 12 and 13 was not started until 1916, which accounts in part for the lower yields on these plots. The outcome to the end of 1919 is shown in Table 59.

TABLE 56.—Plan of fertilizing in potatoes-wheat-clover rotation, Hamilton County Experiment Farm

Plot	On potatoes				On wheat			
	Acid phosphate	Muriate of potash	Nitrate of soda	Manure	Acid phosphate	Muriate of potash	Nitrate of soda	Manure
	Lb.	*Lb.*	*Lb.*	*Tons*	*Lb.*	*Lb.*	*Lb.*	*Tons*
1								
2	200				200			
3	200	50			200	50		
4								
5	200	50	50		200	50	50	
6	400	100	100		400	100	100	
7								
8				8				8
9	200			8	200			8
10								
11	200	50		8	200	50		8
12	200			8				
13								

TABLE 57.—Fertilizers and manure on POTATOES and CLOVER grown in rotation with wheat, Hamilton County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on potatoes	Potatoes						Clover						Plot
		1918—Block L		1919—Block M		6-year average		1918—Block M		1919—Block K		3-year average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	
1	None	30.00	.....	72.33	.....	89.16	.....	3,719	.. ....	6,054*	.....	4,512	.....	1
2	Acid phosphate, 200 lb	31.33	3.33	78.00	8.56	78.16	—2.86	4,497	346	5,881	115	4,698	55	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb	33.33	7.33	75.00	8.44	80.78	7.89	4,324	—260	6,054	576	4,937	161	3
4	None	24.00	.....	63.67	.....	64.75	.....	5,016	.....	5,190	.....	4,907	.....	4
5	Acid phos., 200 lb.; mur. potash, 50 lb.; nit. soda, 50 lb.	38.33	10.77	68.00	4.78	82.22	15.09	4,497	—288	6,313	777	4,673	—177	5
6	Acid phos., 400 lb.; mur. potash, 100 lb.; nit. soda, 100 lb.	56.00	24.89	78.67	15.89	98.28	28.77	5,189	634	4,930	—951	5,343	550	6
7	None	34.67	.....	62.33	.....	71.89	.....	4,324	.....	6,227	.....	4,736	.....	7
8	Manure, 8 tons	82.00	38.78	100.00	32.67	114.25	37.46	6,054	1,730	6,400	577	5,802	1,110	8
9	Manure, 8 tons: acid phosphate, 200 lb	103.00	51.22	117.00	44.67	130.80	49.10	5,016	692	7,784	2,364	6,308	1,659	9
10	None	60.33	.....	77.33	.....	86.61	.....	4,324	.....	5,016	.....	4,606	.....	10
11	Manure 8 tons; acid phos., 200 lb.; mur. potash, 50 lb.	99.00	35.00	111.33	35.44	92.96†	36.62	5,881	1,672	7,176	1,872	5,950	1,303	11
12	Manure, 8 tons; acid phosphate, 200 lb	91.67	30.01	108.67	34.23	91.71†	34.77	4,151	58	5,795	202	5,195	509	12
13	None	71.33	.....	73.00	.....	57.60†	.. ..	3,978	.....	5,881	.....	4,727	.....	13
	Average unfertilized yield	44.07	.....	69.73	.....	79.56	.....	4,272	.....	5,674	.....	4,941	.....	

*Soybeans substituted for clover in 1919 and cut for hay, not included in average.
†4-year average. Plots 11, 12 and 13 started in rotation in 1916.

TABLE 58.—Fertilizers and manure on WHEAT grown in rotation with potatoes and clover, Hamilton County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on wheat	1918—Block K				1919—Block L				5-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	26.67	3,800	.....	.....	18.33	3,400	.....	.....	27.80	3,644	.....	.....	1
2	Acid phosphate, 200 lb	40.00	4,500	10.11	827	26.67	6,000	7.34	2,193	36.87	4,688	8.93	1,093	2
2	Acid phosphate, 200 lb.; muriate potash, 50 lb	45.67	4,660	12.56	1,113	26.33	4,520	6.00	307	39.80	4,372	11.74	827	3
4	None	36.33	3,420	.....	.....	21.33	4,620	.....	.....	28.20	3,496	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 50 lb.; nit. soda, 50 lb.	38.33	5,800	1.55	2,007	21.67	4,100	—.88	—713	35.57	4,626	6.69	996	5
6	Acid phos., 400 lb.; mur. potash, 100 lb.; nit. soda, 100 lb.	51.67	7,700	14.45	3,533	27.33	4,560	3.55	—447	40.57	5,222	11.01	1,458	6
7	None	37.67	4,540	.....	.....	25.00	5,200	.....	.....	30.23	3,898	.....	.....	7
8	Manure, 8 tons	37.33	6,860	.88	2,647	28.33	4,300	2.55	—1,620	37.20	5,108	7.15	1,220	8
9	Manure, 8 tons; acid phosphate, 200 lb	42.00	6,080	6.78	2,193	24.67	4,720	—1.88	—1,920	39.43	5,310	9.58	1,432	9
10	None	34.00	3,560	.....	.....	27.33	7,360	.....	.....	29.67	3,868	.....	.....	10
11	Manure, 8 tons; acid phos., 200 lb.; muriate potash, 50 lb.	47.33	6,360	15.77	3,287	25.00	4,500	—1.55	—1,740	41.83†	5,490†	9.19	1,207	11
12	Manure and acid phosphate on potatoes only	37.67	4,640	8.56	2,053	25.00	6,300	—.78	1,180	37.39†	5,457†	5.20	1,683	12
13	None	26.67	2,100	.....	.....	25.00	4,000	.....	.....	31.72†	3,263†	.....	.....	13
	Average unfertilized yield	32.27	3,484	.....	.....	23.40	4,916	.....	.....	28.98	3 588	.....	.....	

TABLE 59.—Potatoes-wheat-clover rotation, Hamilton County Experiment Farm. Total fertilizing materials, value of increase, cost of treatment and net gain per acre

Plot	Total fertilizing materials on potatoes and wheat				Value of increase	Cost of treatment			Net gain	Plot
	Acid phosphate	Muriate potash	Nitrate soda	Manure		Fertilizers	Harvesting	Total		
	Lb.	*Lb.*	*Lb.*	*Tons*						
2	400	.....	.....	.....	$19.91	$ 6.00	$2.00	$ 8.00	$11.91	2
3	400	100	.....	.....	36.28	13.50	3.88	17.38	18.90	3
5	400	100	100	.....	30.68	18.50	3.00	21.50	9.18	5
6	800	200	200	.....	62.12	37.00	6.18	43.18	18.94	6
8	.....	.....	.....	16	67.74	16.00	6.65	22.65	45.09	8
9	400	.....	.....	16	90.58	22.00	8.96	30.96	59.62	9
11	400	100	.....	16	72.86	29.50	7.26	36.76	36.10	11
12	200	.....	.....	8	56.99	11.00	5.29	16.29	40.70	12

In the final summary, at the end of Tables 55 and 59, the crops are valued at $1 a bushel for corn, $3 for soybeans, $2 for wheat, $1 for potatoes, $20 a ton for hay and $8 per ton for straw and stover. Acid phosphate is computed at $30 a ton, spread on the field, muriate of potash at 7½ cents a pound and nitrate of soda at 5 cents. Manure is computed at $1 a ton to cover cost of hauling from barnyard to field and ground limestone at $6 a ton spread on the land. A column is added in which the cost of harvesting the additional crop produced by the treatment is computed at 25 cents a bushel for the grains, 10 cents a bushel for potatoes and $2 a ton for hay.

Table 59 agrees with the summary of the other rotation in indicating a very profitable increase from the addition of potash. Two years ago it was necessary to estimate the cost of muriate of potash at more than three times its present cost, and it was not found profitable to use it at that cost, but the outcome of the test indicates that at a normal cost—it is still far above normal—potash may be used with decided advantage on Hamilton County soil.

Nirogen, however, makes no better showing in this rotation than in the other, and the outcome thus far would justify the inference that, if clover be grown with sufficient frequency, the purchase of commercial nitrogen may be postponed for a time.

In this test the effect of reinforcing manure with acid phosphate is much more marked than in the other one, the results being in harmony with those obtained at Wooster and elsewhere.

CONCLUSIONS

Taken as a whole, these experiments justify a much larger use of phosphorus and potassium on Hamilton County crops than is generally practiced, and support the dependence upon manure and clover as the chief sources of nitrogen.

COMPARISON OF VARIETIES

DEPARTMENT OF AGRONOMY

CORN

The variety test of corn has included nine varieties, and has extended over a period of 7 years. The Darke County Mammoth has averaged highest in yield, with Orcutt's Reid, second, Cook's 75, third, and Clarage, fourth.

TABLE 60.—Comparison of varieties of CORN, Hamilton County Experiment Farm

	Yield per acre							7-year average	
	1913	1914	1915	1916	1917	1918	1919	Grain	Stover
								Bu.	*Lb.*
Leaming	48.49	54.95	65.40	36.52	28.88	68.81	65.35	52.63	2,082
Clarage (Local)	52.53	57.00	70.20	51.33	49.02	.....	.....	56.02	2,525
White Cap	51.42	43.49	61.84	30.86	32.86	54.75	80.59	50.83	2,149
Cook's 75	57.60	57.52	67.36	39.43	42.28	62.38	74.49	57.29	2,361
Reid (Orcutt)	52.13	61.79	62.35	38.47	46.26	73.81	73.82	58.38	2,640
Ohio 84	42.03	48.03	56.97	33.23	38.57	53.81	55.21	46.84	1,898
Clarage (Northern)	46.60	53.40	63.74	39.42	45.26	52.62	60.72	51.68	2,001
Leaming Cuppy	51.84	67.68	.....	.....	.....	.....	.....	.....	2,227
Darke Co. Mammoth	53.18	61.26	65.88	43.71	49.02	73.57	68.68	59.33	2,443
Connor's Prolific	.....	.....	.....	45.12	49.64	71.19	68.82	.....	4,050
Boone Co. White	.....	.....	.....	.....	.....	67.77	83.45	.....	4,275

OATS AND OTHER SPRING CEREALS

Seven varieties of oats have been tested for 7 seasons, as also one variety of barley—the Oderbrucker. Emmer has been tested 5 seasons and spring wheat 2 seasons. The Big Four variety has given the largest yield, with the Silver Mine second, and Ohio 6222 third. The Oderbrucker barley is much lower in yield than the oats, and emmer still lower. The bushel of barley is figured at 48 pounds and emmer at 32 pounds, the same as oats. Spring wheat gave a good yield in 1918, but was a failure in 1919.

TABLE 61.—Comparison of varieties of OATS and other spring cereals, Hamilton County Experiment Farm

	Yield per acre							7-year average	
	1913	1914	1915	1916	1917	1918	1919	Grain	Straw
								Bu.	*Lb.*
Big Four	17.93	46.21	64.40	28.05	90.13	67.17	25.71	48.51	2,241
Silver Mine	21.51	42.88	65.23	32.31	87.45	48.52	23.20	45.87	2,296
Swedish Select	8.02	27.82	65.02	24.80	77.94	61.80	18.58	40.57	1,966
Ohio 7009	16.92	25.52	65.65	33.15	76.64	51.74	12.89	40.36	1,773
Ohio 6203	11.34	25.81	55.54	31.17	78.51	57.89	22.27	40.36	1,864
Ohio 6222	11.93	36.99	61.80	25.65	85.26	62.27	20.08	43.42	2,127
Wideawake	16.09	38.09	54.82	29.81	79.00	52.89	20.39	41.58	2,429
Iowa 103	.....	.....	.....	.....	78.24	61.56	9.69	.....	1,700
Oderbrucker Barley	8.96	14.38	29.38	17.71	50.70	36.87	1.25	22.75	1,566
Emmer	6.87	23.44	38.44	22.50	29.74	.....	.....	24.20	2,353
Spring Wheat	.....	.....	.....	.....	.....	20.00	1.33	.....	1,285

SOYBEANS AND COWPEAS

Eight varieties of soybeans and one of cowpeas have been tested for 7 seasons. Averaging the results for the full period, the Ohio 9035 is first in yield, Mongol, second, and Ebony, third. In seed production the New Era cowpeas are much inferior to even the poorest yielding soybeans.

TABLE 62.—Comparison of varieties of SOYBEANS, Hamilton County Experiment Farm

Variety	Yield per acre—bushels							Average	
	1913	1914	1915	1916	1917	1918	1919	Grain	Straw
								Bu.	*Lb.*
Mongol	19.46	12.28	18.41	18.31	23 06	24.44	19.11	19.29	2,397
Ebony	16.51	12.25	22.41	17.58	21.73	19 89	17.39	18.25	2,426
Elton	10.34	11.61	21.19	6.53	20.45	19.83	19.50	15.64	1,944
Ohio 9100	15.35	11.34	15.22	9.64	14.72	15.72	23.12	15.01	1,776
Ohio 9016	15.13	*5.51	19.53	11.75	12.78	26.78	18.39	15.69	2,018
Ohio 7496	15.29	11.56	22.85	9.86	.....	.....	.....	.....	2,493
Ohio 9035	19.30	14.17	14.68	21.14	19.79	23.78	22.44	19.33	2,284
Medium Green	13.90	7.92	16.30	8.20	14.00	17.50	17.17	13.57	2,001
Wilson	.....	.....	.....	.....	18.39	19.50	22.01	.....	2,210
New Era cowpeas	5.33	7.08	1.00	2.67	7.50	1.39	2.33	3.90	2,492

*A poor stand.

WHEAT

Ten varieties of wheat have been tested each season. Of those tested the full period of 6 years, the Gladden has given the largest yield, the Red Wave, second, and the Turkey Red third.

TABLE 63.—Comparison of varieties of WHEAT, Hamilton County Experiment Farm

Variety	Yield per acre—bushels						Average	
	1914	1915	1916	1917	1918	1919	Grain	Straw
							Bu.	*Lb.*
Nigger	27.41	25.89	26.97	22.59	25 38	.....	25.65	2,927
Gladden	22.35	28.62	29.34	47.92	35.10	29.95	32.21	3,297
Mediterranean	22.14	25.29	27.38	38.92	.....	34.75	29.70	3,668
Red Wave	28.47	27.57	23.71	34.38	34.82	31.70	30.11	3,265
Turkey Red	22.35	25.56	23.29	42.96	33.54	30.87	29.76	3,614
Ohio 8106	26.57	26.05	24.80	.....	.....	.....	.....	3,160
Portage	28.85	25.23	25.34	25.58	25.50	33.87	27.39	2,616
Goens	23.57	20.45	26.17	37.00	32.99	29.54	28.12	2,587
Velvet Chaff	22.80	25.67	23.92	36.25	29.83	27.04	27.58	3,382
Ohio 9920	.....	.....	30.88	32.33	27.33	39.95	.....	2,864
Ohio 127	.....	.....	.....	40.41	29.66	32.79	.....	3,380
Rudy	.....	.....	.....	.....	30.61	.....	.....	.....
Gypsy	.....	28.62	.....	.....	.....	31.00	.....	3,865

A date of seeding test has been conducted for 5 successive seasons. The seedings have begun early in September and have been continued at intervals of about a week until the last of October.

The dates have varied so much from year to year that it is impossible to average them. Upon consulting the table it will be noted that in 1915 the seeding of September 22 gave the largest yield, October 13, second, and October 5, third.

In 1916 the seeding of September 29 was first. In 1917, October 16 was first. In 1918 September 20 and 27 tied for first. In 1919 September 13 was first. In years in which the Hessian fly is in evidence much later seeding would be required.

TABLE 64.—Date of seeding WHEAT, Hamilton County Experiment Farm

	Yield per acre—bushels				
	1915	1916	1917	1918	1919
September 1		8.00			
September 4			23.40		
September 6				32.00	23.50
September 8	23.83				
September 11		6.67	31.14		
September 13				36.00	28.41
September 15	20.17	14.67			
September 18			31.98		
September 20				40.33	26.77
September 22	27.33	11.67			
September 25			29.96		
September 27				40.33	19.94
September 29	16.67	23.00			
October 2			30.13		
October 5	25.83	14.33		39.67	18.31
October 9			31.14		
October 11					
October 13	26.17	13.67		33.33	22.95
October 16			32.82		
October 18				37.33	22.40
October 20		14.67			
October 23			26.09		
October 25				25.67	20.76
October 27	4.67				
October 30			28.11		

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BULLETIN

OF THE

Ohio Agricultural Experiment Station

NUMBER 344 JUNE, 1920

COUNTY EXPERIMENT FARMS IN OHIO

PART V

THE WASHINGTON COUNTY EXPERIMENT FARM

FIFTH AND SIXTH ANNUAL REPORTS FOR 1918 AND 1919

CHAS. E THORNE, DIRECTOR

CARY W. MONTGOMERY, CHIEF

S .C. HARTMAN, SUPERINTENDENT
C. B. HARVEY, FARM FOREMAN
O. N. RILEY, TRUCK FOREMAN

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment March 1, 1919

General Farm—Fleming

Land and buildings: original cost		$ 7,762.50
Permanent improvements to March 1, 1918		2,221.50
Permanent improvements made in 1918:		
Water system	$ 138.94	
Fence, 128 rods	122.85	
Total permanent improvements 1918		261.79
Total permanent investment		$10,245.79
Operating Equipment:		
Livestock: 5 horses, $465; 119 sheep, $1,170	$1,635.00	
Machinery, tools and harness	1,002.90	
Crops, feeds, etc.: corn, $375; wheat, $40; hay, $300; straw, $20; mill feed, $30	765.00	
Seeds	125.00	
Orchard equipment	87.25	
Fertilizer and limestone	160.00	
Drainage tile	520.00	
Building material: lumber, $100; gravel, $5	105.00	
Sundries: fuel, $3; basket, $1	4.00	4,404.15
Total investments general farm		$14,649.94

Truck Farm—Marietta

Land and buildings: original cost		$ 8,000.00
Permanent improvements to March 1, 1918		810.25
Permanent improvements made in 1918:		
Painting house and repairs	$ 75.00	
Painting barn and repairs	43.95	
Cement steps to house	16.54	
Irrigation system for greenhouse	15.90	
Manure pit, 12 ft. by 24 ft.	59.57	
Total permanent improvements 1918		210.96
Total permanent investment		$ 9,021.21
Operating equipment:		
Livestock: 2 horses	$ 395.00	
Machinery, tools and harness	343.50	
Crops, feed, etc	162.50	
Fertilizer	129.00	
Containers	291.00	
Sundries: stakes, $40; heaters, $45; hotbed mats, $14; canvas, $8	107.00	
Total operating equipment		1,428.0(
Total investments, truck farm		$10,449.2
Total investments, Washington County Experiment Farm		$25,099.1

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1919

RECEIPTS

General Farm—Fleming

Balance forward March 1, 1918	$ 196.59	
Maintenance fund from County Treasury	2,011.19	
		2,182.78
From Farm Sales:		
Livestock and livestock products: sheep, $60; wool, $499.85	$ 599.85	
Crops: corn, $17; wheat, $24.93; soybeans refund, $55; fodder, $33.92; apples, $961.75; seeds and plants, $237.39; pasture $30; feed, laborers, horse, $25	1,384.99	
Sundries: fence, $5; drain tile refund, $10.50; transportation, $1.50; machine hire, $7.65; labor, $15.35; gas royalty, $85	125.00	
		2,069.84
Total receipts, general farm		$4,252.62

Truck Farm—Marietta

From Farm Sales:		
Crops: seeds and plants, $100.25; sweet corn, $526.15; beans, $65.33; fodder, $6; watermelons, $13; tomatoes, $910.86; cucumbers, $189.29; cabbage, $1,987.82	$3,798.70	
Sundries: labor, $6.70; fertilizer, $1.48	8.18	
		$3,806.88
Machinery and tools, warrant for mower returned		68.88
Total receipts, truck farm		$3,875.76
Total receipts, Washington County Experiment Farm		$8,153.38

EXPENDITURES

General Farm—Fleming

For Labor		$2,269.18
For Current Expenses: seeds and plants, $324.92; feeds, $72.95; fertilizer, $246.32; spray material, $16.03; binding material, $3.60; containers, $622.45; machine hire, $29.37; livestock equipment, $8.38; veterinary service, 95 cents; horse shoeing, $29.35; incidentals, $19.25; fence repair, $6.57; water supply maintenance, $38.77; building maintenance, $17.68; implement maintenance, $96.68; engine maintenance, $34.89; office supplies, 73 cents; communications, $21.21; publicity, $13.45; transportation, $303.21; miscellaneous hardware, $5.76; painting, $9	1,921.52	
For Permanent Improvements: fence, $84.80; water supply, $43.69; drainage, $210.84; permanent planting (ornamental), $25.54	364.87	
For Machinery and Tools	87.22	
Total expenditures, general farm		$4,642.79

Truck Farm—Marietta

For Labor		$1,424.25
For Current Expenses: seeds and plants, $103.33; feeds, $167.50; fertilizer, $175.40; spray material, $27.13; binding material, $18.75; containers, $388.06; plot fixtures, $58.24; livestock equipment, $12.50; veterinary service, $15.75; horse shoeing, $22.55; incidentals, $1; water supply maintenance, $10.15; building material and maintenance, $105.50; implement maintenance, $7.45; engine maintenance, $6.05; communication, $41.42; publicity, $51.55; transportation, $59.17; fuel and light, $14.90; miscellaneous hardware, $5.18; painting, $8.65; corn, $100; straw, $12.42	1,412.65	
For Permanent Improvements: building, $9; concrete masonry, $21.15; general, $7.49; permanent planting (ornamental), $6.90	44.54	
For Machinery and Tools	24.65	
Total expenditures, truck farm		$2,906.09
Total expenditures, Washington County Experiment Farm		$7,548.88
By balance forward, February 28, 1918	604.50	
Totals		$8,153.38

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment, March 1, 1920

General Farm—Fleming

Original Cost: land and buildings		$7,762.50
Permanent Improvements to March 1, 1919		2,483.29
Permanent Improvements made in 1919:		
Picnic building and tool shed*	$ 506.69	
68,333 ft. of tile drainage	3,714.32	
Fencing	44.03	
Lumber for lime bin	17.82	
Extending water system	31.27	
Concrete (kitchen)	11.55	
Total improvements 1919		4,325.68
Total permanent investment		$13,190.90
Operating Equipment:		
Livestock: 5 horses, $460; sheep, $1,631	$2,091.00	
Machinery, tools and harness	1,470.90	
Crops, seeds, etc.: corn, $390; wheat, $240; hay, $200; apples, $130; straw, $40; meadow and pasture seed, $136	1,136.00	
Fertilizer and lime	105.00	
Drain tile	50.00	
Spray material	100.00	
Containers	31.00	
Sundries: coal, $2; gravel, $3; plot card holders, $5; printing set, $1.50	11.50	
		4,995.40
Total investment		$18,186.30

Truck Farm—Marietta

Original cost of land and buildings		$8,000.00
Permanent Improvements to March 1, 1919		1,021.21
Permanent Improvements made in 1919—none.		
Total permanent investment		$9,021.21
Operating Equipment:		
Livestock: 2 horses	$390.00	
Machinery, tools and harness	560.05	
Feeds and seeds: hay, $18; straw, $30; corn, $52.50; oats, $60; sweet corn, $3; cucumbers, $9	172.50	
Fertilizer and limestone	126.00	
Sundries: lumber, $17; gravel, $1.50; nails, $7; paint, $6; canvas, $8; containers, $493	532.50	
Plot and greenhouse fixtures	167.75	
Total operating equipment		$1,948.80
Total investment, truck farm		$10,969.01
Total investment, Washington County Experiment Farm		$29,155.91

*Of this amount $116.44 was paid by the Farm Bureau.

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1920

RECEIPTS

General Farm—Fleming

Balance forward from February 28, 1919		$ 604.50
From County:		
Maintenance fund from County Treasury		1,922.95
From Farm Sales:		
Livestock and livestock products: sheep, $190.80; wool, $721.56	$ 912.36	
Crops: oats, $1; wheat, $549.67; apples, $3,639.08; seeds and plants, $6.27; pasture, $96.42	4,292.44	
Sundries: containers, $18; spray material, $2.69; labor, $1; machine hire, $49.86; gas royalty, $85; drain tile, $15	171.55	5,376.35
Total receipts		$7,299.30

Truck Farm—Marietta

From Truck Sales:		
Crops: cabbage, $1,910.13; tomatoes, $713.15; cucumbers, $419.59; sweet corn, $394.39; pop corn, $17.90; fodder, $12; seeds, $164	$3,631.52	
Sundries: containers, $8.80; labor, $26; gas warrant, $1.98	36.78	
Total		$3,668.30
Total receipts		$11,572.10

EXPENDITURES

General Farm—Fleming

For Labor		$2,256.15
For Current Expenses: seeds, $229.17; feeds, $107.85; horse shoeing, $14.85; livestock equipment, $18.70; veterinary, $3.95; livestock incidentals, $9.75; fertilizer, $253.33; spray material, $244.95; containers, $179.70; binding material, $17.29; machine hire, $87.35; painting, $3.10; building renewal and repair, $17.10; transportation, $246.79; communication, $40.72; publicity, $35.21; office supplies, $1.95; miscellaneous hardware, $11.64; fuel and light, $8.35; water supply maintenance, 20 cents; implement maintenance, $27.89; engine maintenance, $35.96..	1,595.80	
For Permanent Improvements: building, $232.42; drainage, $2,772.72; fence, $39.80; concrete and masonry, $27.55; water system, $48.58	3,121.07	
For Machinery, tools and harness	176.81	
For Livestock: sheep	157.50	
Total		$7,307.33

Truck Farm—Marietta

For Labor	$1,678.70	
For Current Expenses: seeds, $89.36; feeds, $163.86; livestock equipment, $4.60; horse shoeing, $45.65; veterinary, $12; livestock incidentals, $2.68; fertilizer, $188.60; spray material, $24.14; containers, $505.67; binding material, $16.75; plot fixtures, $1.05; building repair, $62.51; implement maintenance, $18.05; engine maintenance, $4.85; water supply, 40 cents; communication, $28.46; publicity, $33.15; office supplies, 60 cents; miscellaneous hardware, $6.85; fuel and light, $13.26.....	1,312.49	
For Permanent Improvements	21.05	
For Machinery, tools and harness	167.04	
Total		$3,179.28
Total expenditures, Washington County Experiment Farm..		$10,486.61
Balance forward		1,085.49
Total		$11,572.10

CROP AND LABOR STATISTICS

Of the Washington County Experiment Farm for 1918

GENERAL FARM—Fleming		TRUCK FARM—Marietta	
Total farm	172.52 acers	Total farm	9.80 acres
Farmstead and house gardens	1.25 acres	Farmstead	.70 acres
Cultivated	68.32 acres	Cultivated	7.90 acres
Orchard	20.00 acres	Public roads	.25 acres
Permanent pasture	37.60 acres	Farm roads and paths	.95 acres
Woodland	32.35 acres		
Public roads	7.50 acres		
Farm roads and paths	5.50 acres		

PLOT WORK

Crop	Number of plots	Total area	Yield per acre	Crop	Number of plots	Total area	Total yield	Yield per acre
		Acres				*Acres*	*Lbs.*	*Tons*
Corn	30	3.	39.32 bus.	Cabbage	32	.8	12,218	8.26
Wheat	30	3.	10.11 bus.	Cucumbers	32	.8	6,888	4.18
Hay(clo. & tim)	20	2.25	1.14 tons	Sweet corn	32	.8	6,520	4.08
Hay (soybean)	30	3.	1.27 tons	Tomatoes	83	1.7	26,405	7.77
Total	110	11.25			179	4.1		

FIELD WORK

Corn	11.1	48.39 bus.	Cabbage	1.9	33,710	8.87
Wheat	7.	14.86 bus.	Sweet corn	1.73	10,780	3.22
Rye	1.2	10.80 bus.	Pop corn	.1	240	1.20
Hay clover and timothy	20.13	1.59 tons	Watermelons	.07	778	5.56
Hay (soybean)	9.1	1.04 tons				
Hay (alfalfa)	1.17					
Forage (rape)	3.					
Forage (alfalfa)	3.					
Yards and gardens	1.37					
Total	57.07			3.80		
Total plots and fields.	68.32			7.90		

	General Farm	Truck Farm
Number of work horses	4	2
Crop acres per horses	17.08	3.95
Hours man labor per year ending February 28, 1919	9,965	5,107
Hours horse labor for year ending February 28, 1919	4,351	2,145

CROP AND LABOR STATISTICS

Of the Washington County Experiment Farm for 1919

GENERAL FARM—Fleming		TRUCK FARM—Marietta	
Total farm	172.52 acres	Total farm	9.80 acres
Farmstead and house garden	1.25 acres	Farmstead	.70 acres
Cultivated	69.12 acres	Cultivated	7.90 acres
Orchard	20.00 acres	Public roads	.25 acres
Permanent pasture	37.60 acres	Farm roads and paths	.95 acres
Woodland	32.35 acres		
Public roads	7.50 acres		
Farm roads and paths	4.60 acres		

PLOT WORK

Crop	Number of plots	Total area	Yield per acre	Crop	Number of plots	Total area	Yield per acre
		Acres				*Acres*	
Corn	30	3.	52.4 bus.	Sweet corn	32	.8	3.65 tons
Soybeans	30	3.	1.85 tons	Cucumbers	53	1.01	11.36 tons
Wheat	30	3.	26.84 bus.	Cabbage	32	.9	8.55 tons
Hay (clover)	30	3.	1.27 tons	Tomatoes	44	.8	
Total	120	12.			161	3.51	

FIELD WORK

Corn	10.75	45.62 bus.	Cabbage	2.5	10.556 tons
Wheat	11.	unharvested	Sweet corn	1.1	878 doz.
Rape	3.	unharvested	Pop corn	.2	no yield
Rye (hay)	4.65	.453 tons	Tomatoes	.59	10.935 tons
Oat and pea (hay)	.8	1.228 tons			
Soybean (hay)	9.25	1.067 tons			
Hay (clover)	7.	1.714 tons			
Hay (alfalfa)	1.17	1.025 tons			
Hay (timothy)	9.5	1.167 tons			
Total field acres	57.12			4.39	
Total plots and fields.	69.12			7.90	

	General Farm	Truck Farm
Number of work horses	4	2
Crop acres per work horse	17.28	3.95
Hours man labor for year ending February 29, 1920	10,681	3,041
Hours horse labor for year ending February 29, 1620	4,847	2,388

REPORT OF WORK FOR 1918 AND 1919

S. C. HARTMAN

PERSONNEL

C. B. Harvey has been foreman of the general farm and O. N. Riley has been foreman of the truck work since the establishment of the farm. Both foremen are engaged to continue the work for the coming year.

Progress has been made during the past 2 years on the Washington County Experiment Farm. The various enterprises on the general farm at Fleming have been developed in accordance with plans presented in previous publications and as ever changing conditions seemed to justify. The orchard and sheep work have been given first place in the farm plans. The fundamental problems connected with soil fertility and crop production received due consideration. Something has been done to meet at least in a measure the serious labor problems that are confronting farmers as well as those engaged in other industries. The truck work has been extended in the hope of filling a larger place in the needs of the truck farmer. The problems of the farmers of the county have been kept in mind, and while every step taken by the Experiment Farm cannot be copied by every farmer in the county, yet it is hoped that suggestions may be given which, if judiciously used, may help to solve the problems on other farms.

ORCHARD WORK

The orchard work has been extended by filling the vacancies in Orchard No. III. Many of the old unfruitful trees have been removed from Orchard No. I and trees purchased for practically resetting the entire orchard. The young trees will be set 42 feet each way, and thus will not materially interfere with leaving the best of the old trees. The trees in the old orchard were set 28 feet each way.

The orchards have been fertilized with 4 or 5 pounds of nitrate of soda to each bearing tree and sufficient acid phosphate and limestone to encourage a growth of good, stiff sod between the trees.

The spraying has been thorough even when prospects for a crop seemed rather poor. No accurate test was made of the effects of the treatment, but that it was applied at considerable profit cannot be doubted. The small apple crop of 1919 was largely counterbalanced by a better quality of fruit and a higher price than usual.

THE PASTURE PROBLEM

In order that all feeds on the farm might be fed, the flock of sheep was increased from 92 head in 1917 to 119 head in 1918, and to 140 head in 1919. The increase in the flock has naturally emphasized the pasture problem, which was already a serious one. The pasture area was increased slightly, by fencing off a strip, part of which was too stony to plow, and by clearing off an acre or more of unprofitable woodland and seeding it. We have been growing about 3 acres of rape each year as a pasture supplement. As it happens the field most convenient for rape is probably the poorest field on the farm. The field has been generously fertilized and manured and some increase in production is apparent. It takes fertile soil to grow a good crop of rape. Another field of 8 acres, which has been in the field crop rotation, has been turned over to forage crop work. This makes a material increase in the pasture carrying capacity of the farm. Most important of all, improvement is quite apparent in some of the old pastures. Pasture No. 3, of 8 acres, a hillside pasture, has been pastured heavily in past years and in many places was practically bare. This pasture has been greatly improved by covering the bare spots with litter from the barn floor, strawy manure and some waste from an old straw stack. The pasture was reseeded and pastured only lightly during the early part of the 1919 season, until July of that year.

Pasture No. 4, of 10 acres, had also been pastured heavily prior to 1918. This pasture in many places seemed to be growing nothing but poverty grass. A closer examination showed tiny bluegrass plants struggling for existence. Light pasturing in 1918 apparently resulted in marked improvement. The pasture carried much more livestock in 1919 than it had for several years previous. Half the pasture was fertilized with 200 pounds of acid phosphate per acre and observations will be made in regard to the results. More definite work is planned in pasture improvement work for the coming year.

FIELD CROP ROTATION

The rotation selected for the farm is a 4-year rotation of corn, soybeans for hay, wheat, clover. With our system of livestock feeding this produces more hay than can well be fed with the grain produced. Hawthorne, in U. S. Department of Agriculture, Bulletin 716 (1918), page 42, finds in the Palmer Township survey, that for a 5-year average concentrates formed 56 percent of the ration fed by the farmers of the township. While our plans call for more

roughage than the average used in Palmer Township, yet the ratio of 2 acres in hay to 1 in corn produces more hay than is needed. The proportion of each crop grown in the plot work cannot be changed. Any change that is made must be made in the field work.

It is found that the 4-year rotation in use can be easily modified and a larger acreage of corn grown without materially affecting the plan of the rotation if as much land is seeded to wheat each year as is planted to corn. Some land is seeded to wheat after corn and on some corn follows wheat after a leguminous soil improvement crop. With the 4-year rotation, of the 34 acres available for field work about 8 acres would be in corn each year, while 10 acres more nearly meets the corn requirements for the farm. With 10 acres also in wheat the hay acreage is reduced to 14 acres. Even with this corn acreage there is much more land seeded to a legume than there is with a 3-year rotation. The modified 4-year rotation plan also has many other advantages of the 3-year rotation while retaining most of those of the 4-year plan.

WHEAT

An important crop in any rotation is the cash crop. As is commonly practiced the cash crop is wheat. On a farm 10 miles from market the transportation question becomes of importance in connection with the marketing of such a crop. At least a partial solution has been found, as well as a service rendered to the community, by selecting a pure strain of wheat, the Portage, which is of a good quality and has given excellent yields at the Southeastern Test Farm. Thus far the farm has not been able to supply the demand for seed of this strain. Where so many varieties are threshed by the same machine it is exceedingly difficult to keep a variety pure. While that produced on the farm shows some mixture it is not sufficient to injure the seed for field production.

In 1918 an effort was made to secure some pure Portage seed. The effort was unsuccessful. A small quantity of seed was then hand-picked for a seed plot. This did well and in 1919, 4 acres were seeded to the pure seed. It is hoped that the seed can be kept pure and that we will soon have sufficient pure Portage seed to supply all who desire it in the county.

RYE

With a considerable acreage of rye, both as a cover crop and a forage crop, the source of seed supply becomes important. There are several odd strips around the plots used for testing various

emergency hay and cover crops. By seeding these crops after rye and cutting the rye for seed, a fair supply of seed rye is secured. Rye is an excellent winter cover crop. One advantage is the low cost of seed. Another is the fact that it can be seeded late in the fall and still make good growth.

COST OF SHEEP AND WOOL PRODUCTION

During both years accurate account has been kept of all expenditures on the flock of sheep, including cash, labor and feed. Table 65 gives a comparison of the 2 years' work and results. Both sheep and feed are reduced to unit terms that the 2 years may be the more easily compared. For a stock unit, 10 sheep or 20 lambs are considered the equal of one horse or cow. In calculating feed, a pound of shelled corn or purchased concentrate is considered a feed unit. A ton of hay is equal to 800 feed units and a ton of stover 500. The price used for purchased feed is the actual price paid plus cost of transportation. The price of farm-grown feeds is figured for each month. The actual market price on the first of the month minus the cost of marketing is taken as the price for the month.

TABLE 65.—Comparison of flock of sheep at Washington County Experiment Farm in 1919 with that of the year 1918, showing size of flock, cost of keeping flock and income from flock, also gain or loss for each year

Year	1918	1919
Stock units in flock ..... Number..	9.	11.
Income per unit ..... Dollars..	83.65	115.12
Cost per animal unit ..... Dollars..	94.61	125.25
Loss per animal unit ..... Dollars..	10.96	10.13
Wool sales percent of total income ..... Percent..	66.4	56.98
Selling price of wool per pound ..... Dollars..	0.65	0.67
Cost of growing wool per pound ..... Dollars..	0.78	0.77
Lamb sales percent of total income ..... Percent..	.....	14.
Productive labor per animal unit ..... Hours..	41.4	56.5
Cost of labor per dollar returned ..... Dollars..	0.136	0.17
Grain units per animal unit	875.7	1,552.6
Roughage units per animal unit	1,517.0	1,518.1
Cost of feed per unit of feed ..... Dollars..	0.027	.03
Cost of feed per dollar returned ..... Dollars..	.77	.784
Cost of feed per animal unit ..... Dollars	64.62	92.12

There were 9 animal units in the flock in 1918 and 11 in 1919. The 11 returned $115.12 per unit and the 9, $83.65. The cost of keeping the flock each year exceeded the returns. The loss per animal unit in 1918 was $10.96 and in 1919, $10.13. Cost is difficult to determine accurately, and no claim is made that the costs given would hold true with all flocks or for all feeders. The cost given is believed to be reasonably accurate for factors considered and for conditions existing at the farm. The factors considered in

determining the cost are labor, feed, supplies purchased, depreciation on the flock, buildings and equipment and interest on the investment. The main factors entering cost of production which are not included are taxes and overhead expense. These are minor items and would not materially affect either the figures given or a comparison of the 2 years' work. Any increase in value of sheep or lambs in the flock due to growth and development is credited to the income of the flock as well as the manure produced in the barn. No gain or loss due to market fluctuations of the sheep in the flock is considered. The price of wool, 65 cents in 1918 and 67 cents in

Sheep on pasture, Washington County Experiment Farm

1919, is the average price of all wool sold and includes in both cases tags and pulled wool. As cost of wool is given the price at which wool would have had to sell to have enabled the flock to pay its way, with other prices as given. The cost of growing a pound of wool in 1918 was 78 cents and a cent less in 1919. The cost of both feed and labor were higher in 1919 than 1918. Possibly the most significant fact in the table is that there were no lamb sales in 1918 and in 1919 the lamb sales amounted to 14 percent of the total income. The lamb sales or lack of lamb sales are reflected in almost every item in the table. The year of no lamb sales is also the year of less labor per animal unit and a smaller proportion of concentrates fed. The year of no lamb sales is the year of lower income per animal unit and the higher wool cost.

The labor charge per hour averaged about 25 percent more in 1919 than in 1918 and the feed cost was 10 percent greater per feed unit. The price of wool also increased 3 percent. The cost and selling prices are important factors in determining profit and require the most careful consideration. Profits, however, may possibly more often be increased by improving the quality of the livestock. Were the feed and labor charged at the same price in 1918 that they were in 1919 a better comparison of the 2 years' work would be possible. The loss then and with the wool at the 1919 price would be increased to approximately $20 per animal unit. The fact that this greater loss occurs in the year with no lamb sales is not without some significance. This fact is verified by the conclusions of Hawthorne (U. S. Department of Agriculture, Bulletin 716, page 32), who states that "The farmers who sold lambs received $1.12 per head more from their sheep than those who did not." However, the selling of the lambs does not account for the entire difference of the 2 years' feeding. A closer analysis of the work shows that almost one-third of the flock in 1918 consisted of ewes past their prime which averaged a fleece 2.5 pounds lighter than the younger ewes. The main Delaine flock averaged around 10.4 pounds. In 1919 many but not all the unprofitable ewes had been discarded and some better ones added to the flock. There were in the flock both years about 25 Southdown-Delaine ewes. These ewes have strong lambs and succeed in raising a larger percentage of lambs than do the Delaine ewes. The lambs at a year old weigh little more than do the Delaine lambs. The crossbred ewes shear even less than the poor ewes mentioned above and the lambs shear less than Delaine lambs. Doubtless the loss on the flock would have been eliminated had the crossbred ewes been replaced by good Delaine ewes. The 2 years' work with crossbreds fully justifies the general practice of growing only Delaines on the farms of Washington County. The work of the 2 years further demonstrates the necessity for careful flock management, especially of marketing lambs and of maintaining only flocks of high average quality for profitable sheep husbandry on Washington County farms.

Attention is called to the fact that the prices of sheep and sheep products have not advanced equally with the prices of grains and that improvement of pastures is a dominant factor in making sheep husbandry profitable.

SUMMARY SHEEP REPORT

Washington County Experiment Farm

March 1, 1918 to February 28, 1919

DEBITS		CREDITS	
Item	Value	Item	Value
First Inventory—		Second Inventory—	
Barns	$ 800.00	Barns	$ 784.00
Equipment	39.50	Equipment	36.40
Livestock	1,040.00	Livestock	1,338.00
	$1,879.50		$2,158.40
Sheep bought	165.00	Sheep sold	60.00
Feed consumed*	578.83	Wool sold	499.85
Labor, 682 man hours at 25c	170.50	Manure produced	60.00
Labor, 16 horse hours at 15c	2.40	Estimated labor cost of experimental work	71.38
Supplies bought	4.20	Interest on income to end of year	18.39
Interest on average investments	166.23	To balance (loss)	98.64
	$2,966.66		$2,966.66

March 1, 1919 to February 29, 1920

Barns	$ 784.00	Barns	$ 768.00
Equipment	36.40	Equipment	35.00
Livestock	1,338.00	Livestock	1,622.00
	$2,158.40		$2,425.00
		Sheep sold	11.20
		Lambs sold	179.60
Feed consumed*	993.40	Wool sold	721.56
Labor, 1,034.5 man hours at 30c	310.35	Interest on income	33.84
Labor, 25 horse hours at 15c	3.75	Manure produced	70.00
Supplies bought	9.94	Estimated labor cost of experiment work	100.00
Interest on investment	176.73	To balance (loss)	111.37
	$3,652.57		$3,652.57

*Feed consumed includes pasture at 17½ cents per month per head. Farm-grown feeds were based on value at beginning of each month.

SOIL FERTILITY

No farm can long be considered a success that has a constantly decreasing supply of plant food. During the past 2 years the sales from the farm have been mainly apples, mutton, wool, seeds and vegetables. The seeds carry a considerable amount of phosphorus for each dollar of sale. Doubtless some phosphorus has also been lost in the feeding operations. With a rotation adding large quantities of nitrogen, with a soil rich in potash, with some elements of fertility added in purchased feeds, and with several tons of acid phosphate and ground limestone purchased, the need of the crops for plant food has been generously supplied. The thorough tiling of the plow land of the farm will be an important factor in making the plant food of the soil available for future crops.

THE LABOR PROBLEM

The cost of production of farm products is a complex problem involving many factors. The change in supply or variation in cost of any one of the factors, usually, materially affects the relative use and value of others. The present high price and scarcity of farm labor requires a different farm organization from that of a few years ago. Greater efficiency in the use of man labor is imperative, often necessitating a less efficient use of land, fertilizers, machinery and other factors of production. The progress on the farm with this end in view has been an increase in the use of comparatively cheap acid phosphate fertilizer, the elimination of unproductive areas in farm fields and the increase in production over other areas encouraged by the use of drain tile. Thus efficiency of man labor has been increased by reducing the number of man hours required to produce and harvest a bushel or ton. In planting and cultivating, the use of man labor has been made more efficient by gaining a more complete control of the soil moisture. A greater increase in labor efficiency is also provided by the purchase of larger machinery that one man by driving more horses may accomplish much more and do it more easily.

PERMANENT IMPROVEMENTS

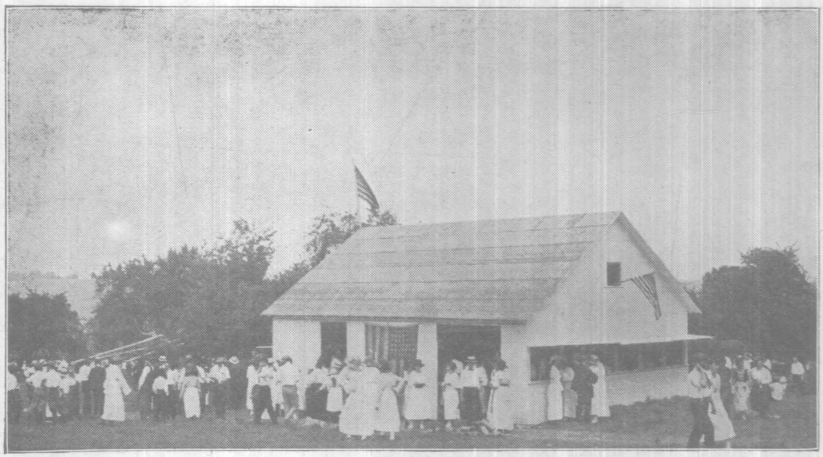
TILE DRAINAGE

During the 2 years 68,333 feet of drain tile have been purchased for the farm at a cost of $2,724.29. Of this number 67,320 feet were laid at a cost of $1,245.67. The cost does not include a charge for the ditcher or its operator, which were furnished by the Station. The 4,200 rods were used in a complete system of tile drainage on about 60 acres of land. The trenches were dug 30 inches deep and the tile lines were laid from 2 to 3 rods apart over practically all the land drained.

About 2½ acres were tiled according to special plans for drainage test. On this area the tiles were laid at varying depths and at different distances apart. The crops from this area will be harvested in such a way as to determine something in regard to the value of tile on rolling land with the type of soil on the farm and if possible to learn something of the best depth and the most economical distance that should intervene between the tile lines. There was on the farm previous to tiling about an acre of land that yielded little or nothing, which will now be some of the best land on the farm. There are other areas on the farm that dry out very slowly in the spring and thus retard the spring work. The draining of these areas will be of considerable advantage in the spring work.

PICNIC BUILDING AND TOOL SHED

For the benefit of those attending the annual picnic, the Farm Bureau each year operates a refreshment stand. A temporary structure has been used, requiring each year considerable time. The farm, too, was in need of more room for storing tools; the two organizations cooperating built a permanent building in 1919. The building is 25 by 30 feet and is so built that it serves both purposes nicely. The total cost of the building, including work done by the farm help and teams, was $506.69. The Farm Bureau paid $116.44 and $390.25 was paid from the farm fund.



Tool shed and refreshment stand, Washington County Experiment Farm

VEGETABLE GROWING

The truck work for the 2 years is summarized in Table 66, which gives the four main crops grown on the Experiment Farm. The acreage including field and plot work is shown, also the net returns per acre for each crop each year, and the net selling price. The average yield per acre is indicated by the number of containers required to market the crop from each acre. The cost of containers and cost of selling is also given per acre. The cost of selling includes commission charges, freight, iceing charge and drayage.

The area in the various crops varies from year to year. Cabbage leads in acreage both years with corn second and tomatoes third. No definite rotation is followed. Only in the fertility work is a definite rotation used. The labor requirement for a crop together with the probable return from the crop have an important influence in determining the area of each crop. Cabbage requires

less labor than tomatoes and the labor does not conflict so seriously with the labor required by other crops. The second column of Table 66 shows tomatoes and cabbage to be the source of by far the largest income for the 2 years.

TABLE 66.—Items of truck crop cost and return

Crop	Acres	Net returns per acre	Net price per package	Containers* used per acre	Containers cost per acre	Selling cost per acre
			1918			
Cabbage	2.7	$756.80	$4.38	172.6 crates	$37.97	$161.50
Corn	2.53	184.40	1.45	127.3 hampers	14.00	51.51
Cucumbers	.8	152.00	1.19	127.5 hampers	14.03	45.25
Tomatoes	1.7	542.40	.77	706 5 baskets	39.23	129.78
			1919			
Cabbage	3.3	$578.66	$2 81	204.5 crates	$71.58	$135.65
Corn	1.9	202.11	1.18	171.0 hampers	22.23	54.70
Cucumbers	1.0	424.78	1.08	395.0 hampers	51.35	124.48
Tomatoes	1.49	476.40	.77	616.0 baskets	45.18	113.90

*The net weight of the various packages varies with the climatic conditions, degree of maturity of the crop, etc, but the following is a fair average weight Cabbage crates contain 100 pounds net; corn hampers, 55 pounds, cucumber hamper, 55 pounds, and tomato baskets 20 pounds.

Of the two crops the income from cabbage varies more than that from tomatoes. This seems to be characteristic. Favorable cabbage years show indication of over production. Poor cabbage years are quite apt to be profitable cabbage years; the statement is especially true if the unfavorable climatic conditions are accompanied with the best of fertilization and tillage. While good care and fertilization practically always pay on cabbage they are doubly important and doubly profitable in those years when natural conditions are not so favorable to the crop. The apparent yields of tomatoes for the 2 years are misleading. The 1918 yield is shown as 90 baskets per acre more than the 1919 yield. There were really more plants set on the 1.49 acres than on the 1.7 acres by 300. In 1918 most of the plants were set as are the plants in the plots, less than 4,000 per acre, while in 1919 many plants were set at the rate of over 5,000 per acre. The year 1918 was by far the best tomato year that we have had since the farm was established. The closer setting as now practiced by the truckers seems to be fully justified by the results of these 2 years' work.

The yield of cucumbers for 1919 was remarkable for the Experiment Farm. In fact, it is the first year there has really been a profitable cucumber crop on the farm. A partially successful attempt was made in 1919 to start the cucumber plants in pots, and

avoid part of the trouble with beetles as well as the setback of resetting the plants. The potted plants all did well but favorable weather later resulted in a good yield from all plants.

Sweet corn is not a crop that brings a large income. It is a crop that requires but little labor in both growing and preparing for market. That part of the gardens which cannot be handled in cabbage or tomatoes, with the available labor, and is not wanted to test out some other crop is planted in corn.

Cabbage in fertility experiments: Plot 22 at right, 23 at left, Washington County Experiment Farm

Other crops grown in a small way are watermelons, popcorn, cantaloupes, spring turnips and field beans. A few watermelons and cantaloupes were grown in 1918. The crop was only fairly profitable when the cost of growing was considered. Popcorn does very well as an emergency crop when too late in the season to justify planting sweet corn. A strip of land was left for tomatoes in 1919, and upon running out of tomato plants it was planted to popcorn. It is not as profitable as sweet corn. In 1918, with unusually high spring potato prices, a small area was planted to spring turnips. The turnips took but little labor and sold well. The crop was followed by navy beans which also sold well and required much of the labor after the more strictly truck crops had been harvested. The combination made a fair proposition; either one alone would not have paid well.

The price per package of all truck crops (column four of Table 66) except tomatoes, was lower in 1919 than in 1918. The total income for the farm was not materially lower in 1919, because of

the better yield of cabbage and sweet corn and particularly of cucumbers. The total acreage of the more remunerative crops was slightly greater in 1919 than in 1918.

The cost of containers promises to continue to be a very important factor in marketing truck crops. By comparing columns headed "containers used per acre" and "containers cost per acre," a substantial increase for containers will be noted in 1919. The lowest proportional cost of containers is that of cabbage in 1918,

Cover crop of cowpeas among tomato stakes, Washington County Experiment Farm

5 percent of the net sales; corn and tomatoes rank next and in the same year at 7½ percent. The highest container cost is cabbage in 1919 at 12½ percent of the net sales, and cucumbers of the same year at 12 percent. The cost of cucumber containers has averaged a little larger proportion of the net sales for the 2 years than the containers for any of the other crops. Naturally the cost of containers bears a closer relation to the yield than to the selling price of the crop, and is most felt in years of good crops and low prices. The cost of containers for an acre of each crop was 80 percent more in 1919 than in 1918.

The cost of selling also averaged more in 1919, although the cost of selling cabbage and tomatoes was less in 1919. The cost of selling corn and cucumbers was so much greater in 1919 that the total selling cost increased 10 percent. Most of the increase in cost of selling was due to freight and charges other than commission. The commission charge averaged about two-thirds of the total selling charge on an acre of each crop for the 2 years. The

selling charge per net dollar of sales was least for cabbage, 20 percent, and most for cucumbers, 30 percent, being similar in this respect to container charges. Selling costs vary more directly with the selling price than with the production per acre.

PUBLICITY WORK

Publicity work in connection with the Washington County Experiment Farm has consisted of newspaper articles, institute talks, fair exhibits and farm meetings. Short articles concerning the work on the farm are submitted to the newspapers of the county at frequent intervals. These articles do not deal with the results, but merely with the progress of the work. The cooperation of the newspapers of the county in this work is appreciated. The superintendent has had the privilege of assisting on the program of many farmers' institutes and other farm organizations during the 2 years. These opportunities are welcomed not only as a means of presenting something of the farm plans and farm results to the people of the county, but also as a chance for studying the farm problems with a view toward increasing the service of the Experiment Farm in the county. Through the cooperation of the two fair boards exhibits were made from the farm at both the Washington County and the Barlow Fairs both years. The farm display was supplemented very efficiently by displays of other departments from the main Station. This was especially true in 1919, when a large agricultural display was made at both fairs.

In cooperation with the Farm Bureau a successful picnic and field meeting was held each year at Fleming. The combined attendance amounted to several thousand, of this number several hundred showing a very satisfactory interest in the experiment work of the farm. In 1919, in cooperation with the College of Agriculture, the first field meeting was held at the gardens in June of 1919. The plot work was inspected and talks were made on problems of first importance to the truckers by specialists from the College and from the Station. The meeting was a success and the plans are to make it an annual affair.

EXPERIMENTS IN THE MAINTENANCE OF SOIL FERTILITY

C. E. THORNE

I. EXPERIMENTS ON FIELD CROPS

Because of the limited area of land suited to plot experiments the study on this farm of the use of fertilizers and manures on field crops is limited to a single experiment on crops grown in the 4-year rotation of corn, soybeans, wheat and clover, and since the livestock on this farm will be chiefly sheep a special study of sheep manure is planned.

Table 67 shows the distribution of fertilizers and manure on the different crops and Table 68 is arranged to exhibit more clearly the plan of the experiment. It will be seen that Plots 2, 3, 5 and 6 in this experiment receive the same treatment as do the correspondingly numbered plots in similar experiments on the other county experiment farms, thus giving opportunity for comparison of this system of crop rotation and treatment under different conditions of soil and climate.

TABLE 67.—Plan of fertilizing, Washington County Experiment Farm

Pounds of fertilizing materials per acre for each crop

Plot	On corn				On soybeans			On wheat		
	Acid phosphate	Muriate potash	Nitrate soda	Limestone	Acid phosphate	Muriate potash	Nitrate soda	Acid phosphate	Muriate potash	Nitrate soda
1										
2	200				100			200		
3	200	50			100	20		200	20	
4										
5	200	50	50		100	20	30	200	20	80
6	200	50	50	1 ton	100	20	30	200	20	80
7										
8	125	90	200					125	90	200
9	375	90	300					375	90	300
10										
11										
12	Sheep manure, 2 T.							Sheep manure, 2 T.		
13	Sheep manure, 2 T.; acid phos., 250 lb.							Sheep manure, 2 T.; acid phos., 250 lb.		
14										
15	Sheep manure, 2 T.; acid phos., 400 lb.							Sheep manure, 2 T.; acid phos., 400 lb.		
16	Sheep manure, 4 T.; acid phos., 400 lb.							Acid phosphate, 400 lb		
17										
18	Sheep manure, 4 T.; acid phos., 400 lb.			1 ton				Acid phosphate, 400 lb		
19	Horse manure, 4 T.; acid phos., 400 lb.							Horse manure, 4 T.; acid phos., 400 lb.		
20										

The complete fertilizer, as used on Plots 5 and 6, contains approximately 4 percent ammonia, 11 percent phosphoric acid and 6 percent potash, as actually made up and used. No commercial fertilizer, however, is made up exclusively of such high grade materials as 16-percent acid phosphate, nitrate of soda and muriate of potash. If these materials are used at all they are diluted with some "filler," which may as well be the earth of the field on

which they are to be used as anything else. The addition of 250 pounds of dirt to these mixtures would give 1,000 pounds of a 3-8-4½ formula, which would contain precisely the same quantities of fertilizing constituents as the 750 pounds actually used.

On Plot 8 the acid phosphate is reduced to one-half the standard application, while the nitrate of soda and muriate of potash are increased. This gives a fertilizer carrying approximately the same quantity of phosphoric acid as the 4 tons of sheep manure used on Plot 12 but still with less ammonia and potash. On Plot 9 a further increase of nitrate of soda is made and the quantity of phosphoric acid is raised to 120 pounds, to compare with the 4 tons of manure reinforced with acid phosphate used on Plot 13. On Plots 15 to 19 the manure is reinforced with still larger quantities of acid phosphate, for the purpose of bringing the ammonia-phosphoric acid-potash ratio to a point more nearly in line with those familiar in commercial fertilizers, although the difference is still large. Estimating manure at 75 percent water, the 4 tons of manure would contain one ton of dry substance which, reinforced with 800 pounds of acid phosphate, would give a 5-6-3½ formula on these plots.

TABLE 68.—Plan of fertilizing, Washington County Experiment Farm. Total fertilizers or manure per acre on entire rotation, with pounds of fertilizing constituents contained.

Plot	Total	Fertilizing constituents			Relative composition
		Ammonia	Phosphoric acid	Potash	
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Percent*
2	500	.....	80	.....	.....
3	590	.....	80	45	.....
5	750	30	80	45	3-8-4½
6	750	30	80	45	3-8-4½
8	830	76	40	90	7½-4-9
9	1,530	114	120	90	11-12-9
12	8,000	140	40	96	14-4-9
13	8,500	140	120	96	9-8-6
15	8,800	140	168	96	5-6-3½
16	8,800	140	168	96	5-6-3½
18	8,800	140	168	96	5-6-3½
19	16,800	136	168	122	3-4-2½

The results of this work, for the years 1918 and 1919, and for the average of the 5 years, 1915 to 1919, are given in Tables 69 to 72. These tables show that acid phosphate has increased the yields of all the crops, although this increase is considerably smaller than has been obtained in other parts of the State.

The addition of muriate of potash to acid phosphate has not yet caused any further increase in the general yield.

With the further addition of nitrate of soda there is a considerable increase in the yield of wheat, but the cost of the fertilizers more than offsets the gain over that produced by acid phosphate alone.

The addition of lime to this complete fertilizer brings the total yield up to double that produced by acid phosphate alone, and leaves a larger net balance than that from acid phosphate, although the cost of treatment is multiplied by four.

TABLE 69.—Fertilizers, lime and manure on CORN grown in rotation with soybeans, wheat, and clover, Washington County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918				1919				5-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	
		Block D				Block C								
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	33.86	1,590	.....	.....	25.79	1,200	.....	.....	38.27	2,21	.....	.....	1
2	Acid phosphate, 200 lb	37.67	1,660	6.14	100	32.21	1,440	3.54	153	43.80	2,62	3.91	247	2
3	Acid phosphate, 200 lb.; muriate potash, 50 lb	38.57	1,860	9.38	330	40.07	1,440	8.52	67	46.28	2,713	4.77	172	3
4	None	26.86	1,500	.....	.....	34.43	1,460	.....	.....	43.13	2,704	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 50 lb.; nit. soda, 50 lb	34.29	1,700	7.43	153	39.71	1 595	4.92	112	48.70	2,894	5.83	232	5
6	Acid phos., 200 lb.; mur. pot., 50 lb.; nit. soda, 50 lb. ground limestone, 2,000 lb	36.71	1,950	9.85	357	48.57	1,935	13.43	428	52.21	3,001	9.60	380	6
7	None	26.86	1,640	.....	.....	35.50	1,530	.....	.....	42.36	2,579	.....	.....	7
8	Acid phos., 125 lb.; mur. potash, 90 lb.; nit. soda, 200 lb	42.00	2,260	12.71	517	44.71	1,700	13.85	327	51.29	2,779	11.57	307	8
9	Acid phos., 375 lb.; mur. potash, 90 lb.; nit. soda, 300 lb	51.71	2,310	20.00	463	45.21	1,585	19.00	368	52.48	2,839	15.41	472	9
10	None	34.14	1,950	.....	.....	21.57	1,060	.....	.....	34.43	2,260	.....	.....	10
	Average unfertilized yield	30.43	1,670	.. ..	.....	29.32	1,312	.....	.....	39.55	2,440	.....	.....	
		Block H				Block G								
11	None	29.86	1,650	.....	.....	51.14	2,450	.....	.....	48.43	3,203	.....	.....	11
12	Sheep manure, 2 tons	41.14	2,280	12.57	693	55.57	2,650	5.57	267	58.27	3,505	11.41	340	12
13	Sheep manure, 2 tons; acid phosphate, 250 lb	44.71	2,350	17.42	827	62.43	2,570	13.58	253	55.24	3,514	9.96	388	13
14	None	26.00	1,460	.....	.....	47.71	2,250	.....	.....	43.71	3,088	.....	.....	14
15	Sheep manure, 2 tons; acid phosphate, 400 lb	46.43	2,600	19.19	1,023	61.57	2,670	18.38	343	53.14	3,578	10.39	514	15
16	Sheep manure, 4 tons; acid phosphate, 400 lb	46.57	2,410	18.10	717	62.14	2,720	23.48	317	53.33	3,416	11.53	375	16
17	None	29.71	1 810	.....	.....	34.14	2,480	.....	.....	40.84	3,017	.....	.....	17
18	Sheep manure, 4 tons; acid phos., 400 lb.; ground limestone, 2,000 lb	46.00	2,770	12.29	750	60.43	2,140	25.91	—263	57.89	3,518	15.54	425	18
19	Horse manure, 4 tons; acid phosphate, 400 lb	52.43	2,980	14.72	750	56.86	2,350	21.95	23	52.76	3,624	8.91	454	19
20	None	41.71	2,440	.....	.....	35.29	2 250	.....	.....	45.36	3,246	.....	.....	20
	Average unfertilized yield	31.82	1,840	.....	.....	42.07	1,616	.. ..	.....	44.47	2,716	.....	.....	

TABLE 70.—Fertilizers, lime and manure on WHEAT grown in rotation with corn, soybeans and clover, Washington County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918				1919				Average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
		Block B				Block A				4-year average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	1.75	545	.....	.....	17.50	1,150	.....	.....	7.60	669	.....	.....	1
2	Acid phosphate, 200 lb.	11.17	1,280	9.28	793	24.17	2,100	5.23	670	12.37	1,207	4.22	460	2
3	Acid phosphpate, 200 lb.; muriate potash, 20 lb.	6.42	615	4.39	187	23.50	2,140	3.11	430	11.83	1,130	3.13	304	3
4	None	2.17	370	.....	.....	21.83	1,990	.....	.....	9.25	904	.....	.....	4
5	Acid phos., 200 lb.; mur. pot., 20 lb.; nitrate soda, 80 lb.	9.50	1,130	6.97	682	31.67	3,800	7.95	1,507	17.29	1,962	7.28	928	5
6	Acid phos., 200 lb.; mur. pot., 20 lb.; nitrate soda, 80 lb.	12.00	1,430	9.11	903	33.67	3,980	8.06	1,383	19.08	2,180	8.30	1,015	6
7	None	3.25	605	.....	.....	27.50	2,900	.....	.....	11.54	1,295	.....	.....	7
8	Acid phos., 125 lb.; mur. pot., 90 lb.; nitrate soda, 200 lb.	12.08	1,375	9.30	858	30.83	3,950	5.33	1,530	19.35	2,189	8.61	1,008	8
9	Acid phos., 375 lb.; mur. pot., 90 lb.; nitrate soda, 300 lb.	11.67	1,450	9.37	1,022	32.50	4,100	9.00	2,160	19.96	2,265	10.03	1,198	9
10	None	1.83	340	.....	.....	21.50	1,460	.....	.....	9.12	952	.....	.....	19
	Average unfertilized yield	2.25	465	.....	.....	22.08	1,875	.....	.....	9.38	953	.....	.....	
		Block F				Block E				4-year average				
11	None	7.00	830	.....	.....	23.83	2,320	.....	.....	13.14	1,336	.....	.....	11
12	Sheep manure, 2 tons	9.42	1,435	2.48	635	27.33	2,460	3.00	87	15.85	1,524	3.14	220	12
13	Sheep manure, 2 tons; acid phosphate, 250 lb.	15.17	1,990	8.28	1,220	28.17	2,660	3.34	233	18.60	1,921	6.32	650	13
14	None	6.83	740	.....	.....	25.33	2,480	.....	.....	11.85	1,239	.....	.....	14
15	Sheep manure, 2 tons; acid phosphate, 400 lb.	13.75	1,675	6.59	872	33.17	3,560	8.45	1,193	19.02	1,921	6.96	697	15
16	Acid phosphate, 400 lb. (manure on corn)	12.92	1,625	5.42	758	29.83	3,760	5.72	1,507	16.85	2,101	4.57	892	16
17	None	7.83	930	.....	.....	23.50	2,140	.....	.....	12.50	1,195	.....	.....	17
18	Acid phosphate, 400 lb. (manure and limestone on corn)	15.00	1,750	8.00	887	29.17	3,550	6.11	1,767	19.46	1,970	7.25	843	18
19	Horse manure, 4 tons; acid phosphate, 400 lb.	13.58	1,685	7.42	888	30.83	3,950	8.22	2,523	19.39	2,136	7.48	1,078	19
20	None	5.33	730	.....	.....	22.17	1,070	.....	.....	11.62	990	....	.....	20
	Average unfertilized yield	6.75	807	.....	.....	23.71	2,002	.....	.....	12.28	1,189	... ...	.....	

TABLE 71.—Fertilizers, lime and manure on SOYBEANS and CLOVER grown in rotation with corn and wheat, Washington County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on soybeans	Soybean hay						Clover					
		1918		1919		4-year average		1918		1919		3-year average	
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase
		Block A		Block D		4-year average		Block C		Block B		3-year average	
		Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
1	None	1,100	.....	3,100	.....	2,562	.....	907	.....	302	.....	1,167	.....
2	Acid phosphate, 100 lb	1,390	327	3,900	833	3,085	557	1,991	678	400	139	1,772	531
3	Acid phosphate, 100 lb.; muriate potash, 20 lb	830	—197	3,000	—33	2,657	163	2,693	975	249	30	1,858	544
4	None	990	.....	3,000	.....	2,460	.....	2,124	.....	178	.....	1,387	.....
5	Acid phos., 100 lb.; mur. potash, 20 lb.; nitrate soda, 30 lb.	2,280	1,150	2,750	0	2,757	254	2,213	216	320	101	1,858	405
6	Acid phos., 100 lb.; mur. potash, 20 lb.; nitrate soda, 30 lb.*	2,360	1,090	4,100	1,600	3,465	918	3,182	1,313	844	583	2,619	1,100
7	None	1,410	.....	2,250	.....	2,590	.....	1,742	.....	302	.....	1,585	.....
8	(Fertilized on corn and wheat only)	2,140	787	3,400	983	2,897	401	1,431	—196	711	453	2,071	411
9	(Fertilized on corn and wheat only)	2,100	803	4,750	2,167	2,957	554	1,769	258	836	623	2,359	623
10	None	1,240	.....	2,750	.....	2,310	.....	1,396	.....	169	.....	1,811	.....
	Average unfertilized yield	1,185	.....	2,775	.....	2,480	.....	1,542	.....	238	.....	1,487	.....
		Block E		Block H		4-year average		Block G		Block F			
11	None	2,060	.....	3,750	.....	3,102	.....	1,680	.....	613	.....	1,813	.....
12	(Manured on corn and wheat only)	2,660	627	4,600	867	3,765	715	2,676	922	1,298	658	2,759	920
13	(Manured and fertilized on corn and wheat only)	1,710	—297	4,400	683	3,202	205	2,764	937	2,320	1,654	3,016	1,152
14	None	1,980	.....	3,700	.....	2,945	.....	1,901	.....	693	.....	1,890	.....
15	(Manured and fertilized on corn and wheat only)	3,240	1,077	4,600	800	3,480	431	2,951	1,008	2,302	1,641	3,075	1,169
16	(Manured and fertilized on corn and wheat only)	3,130	783	3,950	50	3,370	217	2,978	990	1,689	1,061	3,099	1,177
17	None	2,530	.....	4,000	.....	3,257	.....	2,027	.....	596	.....	1,938	.....
18	(Manured, limed and fertilized on corn and wheat only)	3,020	693	4,550	550	3,717	573	3,404	1,279	2,036	1,393	3,351	1,265
19	(Manured and fertilized on corn and wheat only)	2,970	847	4,800	800	3,417	387	3,271	1,049	2,613	1,922	3,784	1,550
20	None	1,920	.....	4,000	.....	2,917	.....	2,320	.....	738	.....	2,382	.....
	Average unfertilized yield	1,850	.....	3,862	.....	2,986	.....	1,982	.....	660	.....	2,006	.....

*Ground limestone, 2,000 lb. on corn.

Omitting the lime and increasing the chemicals to a composition approaching that of manure, on Plots 8 and 9, results in the total elimination of profit, because of the high cost of the nitrogen and potash.

When manure is computed at not more than one dollar a ton, the net gain from its use is greater than that from any of the fertilizer combinations employed; but if the nitrogen, phosphorus and potassium of manure were computed at their cost in chemicals, the cost of a ton of sheep manure would amount to nearly $14, and the deficit following its use would be greater than that from chemicals.

The reinforcement of sheep manure with acid phosphate has increased the yield, but not enough, thus far, to cover the cost of the phosphate, and this is also true of the reinforcement of phosphated manure with lime.

TABLE 72.—Total fertilizing materials and cost, value of increase and net gain or loss per acre for one 4-year rotation, Washington County Experiment Farm

Plot	Total fertilizing materials					Value of increase	Cost of treatment	Net gain or loss (—)
	Acid phosphate	Muriate potash	Nitrate soda	Ground limestone	Manure			
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Tons*	*Dollars*	*Dollars*	*Dollars*
2	500	.....	.....	.....	.....	23.23	7.50	15.73
3	500	90	.....	.....	.....	18.10	14.25	3.85
5	500	90	160	.....	.....	26.98	22.25	4.73
6	500	90	160	2,000	.....	46.38	28.25	18.13
8	250	180	400	.....	.....	36.91	37.25	—.34
9	750	180	600	.....	.....	47.24	54.25	—7.01
12	.....	.....	.....	.....	4	34.04	4.00	30.04
13	500	.....	.....	.....	4	36.17	11.50	24.67
15	800	.....	.....	.....	4	40.31	16.00	24.31
16	800	.....	.....	.....	4	34.61	16.00	18.61
18	800	.....	.....	2,000	4	48.42	28.00	20.42
19	800	.....	.....	.....	8	43.26	20.90	23.26

Comparing Plots 15 and 16, it seems that it has been better to divide the manure between the corn and wheat than to put it all on the corn.

Comparing Plots 15 and 19, it seems that 4 tons of sheep manure has produced nearly the same effect as 8 tons of horse manure.

In conclusion: At this stage of the work these experiments encourage the careful saving and moderate use of manure, this to be supplemented by acid phosphate and powdered limestone on land that cannot be reached with the manure.

COMPARISON OF VARIETIES

DEPARTMENT OF AGRONOMY

CORN

The variety test of corn includes seven varieties. A selection of Reid's, known as Cook's 75, averages highest in yield, Connor's Prolific, second, and Darke County Mammoth, third. In yield of stover Connor's Prolific has a large lead.

TABLE 73.—Comparison of varieties of CORN, Washington County Experiment Farm

	Yield per acre						Average	
	1914	1915	1916	1917	1918	1919	Grain	Stover
							Bu.	*Lb.*
Leaming	30.42	52.12	64.40	52.60	38.87	74.64	52.17	2,862
Ried (Orcutt)	39.98	58.70	.....	.....	.....	.....	.....	3,892
Cook's 75	.....	60.45	75.45	62.32	42.63	79.79	64.13	3,476
Fleming White Cap	41.44	.....	69.44	.....	.....	.....	.....	3,312
Ohio 84	27.91	61.18	60.54	56.66	45.16	55.21	51.11	3,000
Clarage	32.35	56.04	57.10	61.80	40.97	58.36	51.10	3,078
Connor's Prolific	.....	58.85	70.60	51.56	43.06	58.21	56.46	5,829
Darke Co. Mammoth	38.54	55.94	63.21	61.18	40.54	69.07	54.75	4,143
Ried's Yellow Dent (Local)	.....	.....	.....	59.42	40.96	69.92	.....	3,583

WHEAT

Seven varieties of wheat have been tested for four seasons. The Mediterranean has given the largest yield, the Nigger, second, and the Gladden third. These same three varieties have also averaged highest in yield of straw.

TABLE 74.—Comparison of varieties of WHEAT, Washington County Experiment Farm

	Yied per acre				Average	
	1916	1917	1918	1919	Grain	Stover
					Bu.	*Lb.*
Trumbull	14.26	16.96	.....	20.43	17 .22	1,889
Ohio 9920	19.90	18.29	10.43	31.48	20 .02	1,797
Red Wave	14.82	11.68	11.54	24.76	15 .70	1,792
Gladden	21.68	23.58	13.63	26.65	21 .38	2,696
Nigger	21.82	23.46	11.54	28.82	2 1.41	2,135
Mediterranean	20.27	25.79	16.38	30.26	23.17	2,967
Velvet Chaff	14.96	19.29	11.54	24.54	17.58	1,925

SOYBEANS

The soybean tests extend over 4 years—2 years of seed production and 2 of hay. In seed production Ohio 9035 is first, Elton second and Ohio 9100 third. In yield of hay, Ohio 9035 is also first, Auburn second and Medium Green third. As in other Ohio tests cowpeas yield very low in seed production, although quite well in forage.

TABLE 75.—Comparison of varieties of SOYBEANS, Washington County Experiment Farm

Variety	Yield per acre			Average	
	1915	1916	1917	Grain	Straw
				Bu.	*Lb.*
Mongol*	18.68	10.72	.....	14.70	4,440
Elton*	17.73	13.95	.....	15.84	2,980
Ebony*	11.40	13.10	.....	12.25	2,550
Ohio 9100	17.34	12.61	9.00	14.97	2,800
Ohio 9035	22.57	10.89	.....	16.73	4,915
Medium Green	11.62	9.16	9.75	10.35	3,098
New Era Cowpea	1.50	1.67	.....	1.58	4,005

*Not grown in 1917.

TABLE 76.—Comparison of varieties of SOYBEANS for HAY, Washington County Experiment Farm

Variety	Pounds per acre		Average
	1918	1919	
Ebony	.....	3,500	.....
Ohio 9035	3,750	4,350	4,050
Auburn	3,600	4,000	3,800
Ohio 9100	3,700	3,750	3,725
Cloud	3,800	3,600	3,700
Mammoth Yellow	2,550	1,400*	1,975
Medium Green	3,737	3,737	3,787

*A poor stand.

INCREASING THE YIELD OF TRUCK CROPS

C. E. THORNE

The experiments on increasing the yield of truck crops occupy two parallel series of plots containing 1-40 acre each. Series A receives a basic treatment of ground limestone, spread over all the land every second season, at the rate of 2 tons per acre, and a cover crop, consisting of cowpeas after sweet corn, cabbage and tomatoes, and rye after cucumbers.

Series B receives as basic treatment a cover-crop, consisting of rye on part of the land and cowpeas on the remainder, excepting Plot 21, which receives straw mulch.

Each series consists of 4 blocks of 16 plots each, on which the 4 crops, sweet corn, cucumbers, cabbage and tomatoes, are grown in rotation, each crop being grown every season in both series.

The average value of the crops grown on the land receiving the basic treatment of limestone and cover-crops has been $218 per acre. That on the land receiving cover crops only as a basic treatment has been $188, or $31 less. The combination of limestone

and cover crop on Plots 16 and 33 has produced total yields of only $205 and $210, but these plots are on the west side of the field, where the yields run lower than on the eastern three-quarters. Compared with Plots 32 and 35, receiving cover crops only, the liming of Plot 33 has apparently increased the yield by $28.70, or near the same amount found by comparing the yields from the basic treatments. Comparing Plots 31 and 32, the apparent gain for limestone is $10.44, if measured by the total yields, or $17.30, if measured by the increase from fertilizers. Comparing the manured plots, 25 with 24 and 27, the gain for liming is $15.96.

It seems clear that it is worth while to use lime on this land.

In the following table the principal treatments in this experiment are arranged in such manner as to show the effect of increasing treatments, calculated per acre.

Treatment and plots	Total value	Net value
Cover crops only (22-29-32-36)	$218	$208
Lime and cowpea cover crop (1-4-7-10-15-16-33)	188	184
Lime, cover-crops, acid phosphate (11)	254	238
Lime, cover-crops, acid phosphate, nitrate of soda (34)	257	233
Lime, cover-crops, acid phosphate, nitrate soda, muriate potash (31)	286	258
Lime, cover-crops, manure (3)	274	224
Lime, cover-crops, manure, acid phosphate (2)	290	234
Manure, cover-crops (24-27)	289	245
Manure, lime, cover-crops (25)	306	256
Manure, lime, cover-crops, acid phosphate (28)	312	256
Manure, lime, cover-crops, acid phosphate, nitrate soda (26)	331	267

The theory of the cover-crop is that during the late fall and early spring it will catch and hold nitrates that would otherwise be carried off in the drainage water and lost.

In computing the net values in this table the cost of the application of 1 ton of ground limestone is estimated at $6; that of the cover-crop at $4 per acre, for seed and labor; that of acid phosphate, at $6 per acre, or $30 a ton for acid phosphate; that of nitrate of soda, at $8 per acre, or $100 a ton for the nitrate; that of muriate of potash, at $4 per acre, or $160 a ton for the muriate, and that of manure at $2.50 a ton, spread on the land, or $40 per acre.

Of course these valuations, as those of the crops, are only approximations. They will vary in different seasons and under different circumstances.

LEGEND
Area 10 acres
Size of plots indicated 22 ft. 2 1-4 in. x 56 ft. 7 3-5 in.
Working size of plots 20 ft. x 54 ft 5 2-5 in.
Plots contain 1-40 acre

Plan of Washington County Truck Experiment Farm

Washington County Truck Experiment Farm: Plan of experiments in the use of fertilizers, manures and cover crops. Fertilizers and manures per acre. Plots 1-40 acre

SERIES A SOIL FERTILTY PLOTS		SERIES B SOIL IMPROVEMENT PLOTS	
1	Unfertilized	21	Unfertilized. Mulched with straw
2	Shed manure, 16 tons Acid phosphate, 400 lb.	22	Unfertilized
3	Shed manure, 16 tons	23	Manure, 16 tons Acid phosphate, 400 lb. Nitrate soda, 160 lb.; mur. potash, 50 lb.
4	Unfertilized	24	Manure, 16 tons
5	City manure, 16 tons	25	Manure, 16 tons Ground limestone, 1 ton
6	Acid phosphate, 800 lb. Nitrate soda, 320 lb. Muriate potash, 100 lb.	26	Manure, 16 tons; ground limestone, 1 ton Acid phosphate, 400 lb. Nitrate soda, 160 lb.
7	Unfertilized	27	Manure, 16 tons
8	Acid phosphate, 400 lb. Nitrate soda, 160 lb. Muriate potash, 50 lb.	28	Manure, 16 tons Acid phosphate, 400 lb. Ground limestone, 1 ton
9	Acid phosphate, 400 lb. Nitrate soda, 160 lb.	29	Unfertilized
10	Unfertilized	30	Acid phosphate, 400 lb. Nitrate soda, 160 lb. Muriate potash, 50 lb.
11	Acid phosphate, 400 lb.	31	Acid phosphate, 400 lb. Nit. soda, 160 lb.; mur. potash, 50 lb. Ground limestone, 1 ton
12	Nitrate soda, 80 lb. Sulphate ammonia, 65 lb.	32	Unfertilized
13	Unfertilized	33	Ground limestone, 1 ton
14	Nitrate 160 lb. (In two applications)	34	Acid phosphate, 400 lb. Nitrate soda, 160 lb. Ground limestone, 1 ton
16	Nitrate soda, 160 lb. (In one application)	35	Unfertilized
16	Unfertilized	36	Acid phosphate, 400 lb. Ground limestone, 1 ton

Plots 1 to 16 are cross-dressed every second season with finely-ground raw limestone, 2 tons per acre, spread over fertilized and unfertilized land alike. They have also received a cover crop of cowpeas after sweet corn, cabbage and tomatoes, and of rye after cucumbers.

Plots 22 to 28, inclusive, receive a cover crop of rye after each crop and Plots 29 to 36 receive a cover crop of cowpeas after each crop except cucumbers, which are followed by a rye cover crop.

TABLE 77.—Fertilizers, lime and manure on TRUCK CROPS, Washington County Truck Experiment Farm. Soil fertility, Series A, 1918

Plot	Treatment per acre for each crop*	Yield and increase in pounds per acre										Plot
		Sweet corn Block D		Cucumbers Block A		Cabbage Block B		Tomatoes Block C		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
1	None	8,400		3,650		13,440		15,400		10,222		1
2	Shed manure, 16 tons; acid phosphate, 400 lbs	9,280	867	7,520	3,467	19,240	6,093	22,060	6,113	14,525	4,135	2
3	Shed manure, 16 tons	8,760	333	4,860	403	18,760	5,907	21,710	5,217	13,522	2,965	6
4	None	8,440		4,860		12,560		17,040		10,725		4
5	City manure, 16 tons	8,840	613	10,900	4,870	17,120	4,333	20,810	4,053	14,417	3,467	5
7	Acid phos., 800 lb.; mur. potash, 100 lb.; nit. soda, 320 lb.	8,840	827	10,720	3,520	18,240	5,227	21,270	4,797	14,767	1,093	6
8	None	7,800		8,370		13,240		16,190		11,400		7
8	Acid phos., 400 lb.; mur. potash, 50 lb. nit. soda, 160, lb.	8,440	813	10,550	2,237	16,280	2,827	18,950	2,653	13,555	2,132	8
9	Acid phosphate, 400 lb., nitrate soda, 160 lb	9,000	1,547	9,120	863	17,040	3,373	18,500	2,097	13,415	1,970	9
10	None	7,280		8,200		13,880		16,510		11,467		10
11	Acid phosphate, 400 lb	8,320	1,267	8,050	—490	14,800	1,227	19,050	2,877	12,555	1,220	11
12	Nitrate soda, 80 lb.; sulphate ammonia, 65 lb.	7,440	613	8,080	—800	15,520	2,253	17,000	1,163	12,010	807	12
13	None	6,600		9,220		12,960		15,500		11,070		13
14	Nitrate soda, 160 lb. (in 2 applications)	7,120	187	7,250	—1,343	16,520	3,373	15,920	1,060	11,702	819	14
15	Nitrate soda, 160 lb. (in 1 application)	6,920	—347	8,080	113	16,280	2,947	15,440	1,220	11,680	983	15
16	None	7,600		7,340		13,520		13,580		10,510		16
	Average unfertilized yield	7,687		6,940		13,267		15,703		10,899		

*All the land in this series, fertilized and unfertilized alike, is cross-dressed every second season with finely-ground limestone, 2 tons per acre, and all has received a cover crop consisting of cowpeas after sweet corn, cabbage and tomatoes and rye after cucumbers.

TABLE 78.—Fertilizers, lime and manure on TRUCK CROPS, Washington County Truck Experiment Farm
Soil fertility, Series A, 1919

Plot	Treatment per acre for each crop*	Yield and increase in pounds per acre										Plot
		Sweet corn Block A		Cucumbers Block B		Cabbage Block C		Tomatoes Block D		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
1	None	7,240		21,020		14,720		9,000		12,995		1
2	Shed manure, 16 tons; acid phosphate, 400 lb.	8,120	720	23,220	1,680	22,020	6,940	14,250	5,487	16,902	3,707	2
3	Shed manure, 16 tons	7,920	360	22,460	400	22,080	6,640	13,680	5,153	16,535	3,138	3
4	None	7,720		22,580		15,800		8,290		13,597		4
5	City manure, 16 tons	8,800	1,360	22,250	890	20,520	5,093	11,230	2,873	15,700	2,554	5
6	Acid phos., 800 lb.; mur. potash, 100 lb.; nit. soda, 320 lb.	8,760	1,600	16,840	—3,300	20,360	5,307	11,100	2,677	14,265	1,571	6
7	None	6,880		18,920		14,680		8,490		12,242		7
8	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	7,760	587	19,600	—1,477	17,720	3,213	9,400	1,353	13,620	860	8
9	Acid phosphate, 400 lb.; nitrate soda, 160 lb	7,640	173	21,520	—1,713	17,880	3,547	9,630	2,027	14,167	1,008	9
10	None	7,760		25,390		14,160		7,160		13,617		10
11	Acid phosphate, 400 lb.	7,480	—200	27,300	467	16,640	3,027	7,760	770	14,795	1,016	11
12	Nitrate soda, 80 lb.: sulphate ammonia, 65 lb.	7,880	280	32,640	4,363	14,760	1,693	7,350	530	15,657	1,716	12
13	None	7,520		29,720		12,520		6,650		14,102		13
14	Nitrate soda, 160 lb. (in 2 applications)	8,160	853	26,260	—1,790	13,360	1,773	6,850	30	13,657	216	14
15	Nitrate soda, 160 lb. (in 1 application)	8,080	987	30,140	3,760	12,160	1,507	6,660	—330	14,260	1,481	15
16	None	6,880		24,710		9,720		7,160		12,117		16
	Average unfertilized yields	7,333		23,723		13,600		7,792		13,112		

*All the land in this series, fertilized and unfertilized alike, is cross-dressed every second season with finely-ground limestone, 2 tons per acre, and all has received a cover crop, consisting of cowpeas after sweet corn, cabbage and tomatoes and rye after cucumbers.

TABLE 79.—Fertilizers, lime and manure on TRUCK CROPS, Washington County Truck Experiment Farm
Soil fertility, Series A—5-year average, 1915-1919

Plot	Treatment per acre for each crop*	Yield and increase in pounds per acre										Plot
		Sweet corn		Cucumbers		Cabbage		Tomatoes		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
1	None	7,152	.....	11,414	.....	15,344	.....	12,124	.....	11,508	.....	1
2	Shed manure, 16 tons; acid phoshhate, 400 lb	7,332	387	13,788	2,935	20,948	5,545	15,898	3,676	14,491	3,136	2
3	Shed manure, 16 tons	7,096	357	12,132	1,839	19.968	4,507	15,616	3,296	13,703	2,500	3
4	None	6,532	.....	9,732	.....	15,520	.....	12,418	.....	11,050	.....	4
5	City manure, 16 tons	7,512	1,000	12,366	2,308	18,968	3,554	14,884	2,660	13,432	2,381	5
6	Acid phos., 800 lb.; mur. potash, 100 lb.; nit. soda, 320 lb.	7,752	1,260	12,612	2,228	20,912	5,606	15,984	3,554	14,315	3,162	6
7	None	6,472	.....	10,710	.....	15,200	.....	11,836	.....	11,054	.....	7
8	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	7,164	653	14,130	3,173	18,684	3,772	13,316	1,503	13,323	2,275	8
9	Acid phos., 400 lb.; nitrate soda, 160 lb	7,460	911	14,132	2,927	18,388	3,764	14,422	2,631	13,600	2,558	9
10	None	6,588	.....	11,452	.....	14,336	.....	11,768	.....	11,03€	.....	10
11	Acid phosphate, 400 lb	7,388	784	13,634	2,213	16,352	2,133	13,434	1,831	12,702	1,740	11
12	Nitrate soda, 80 lb.; sulphate ammonia, 65 lb	6,748	128	11,782	391	15,640	1,539	11,450	11	11,405	517	12
13	None	6,636	.....	11,360	.....	13,984	.....	11,274	.....	10,813	.....	13
14	Nitrate soda, 160 lb. (in 2 applications)	6,756	43	12,118	763	15,128	1,648	10,394	—587	11,099	467	14
15	Nitrate soda, 160 lb. (in 1 application)	6,936	145	13,134	1,783	14,880	1,904	10,580	—109	11,382	931	15
16	None	6,868	.....	11,346	.....	12,472	.....	10,396	.....	10,270	.....	16
	None	6,791	.....	10,979	.....	14,476	.....	11,636	.....	10,970	.....	

*All the land in this series, fertilized and unfertilized alike, is cross-dressed every second season with finely-ground limestone, 2 tons per acre, and all has received a cover crop, consisting of cowpeas after sweet corn, cabbage and tomatoes and rye after cucumbers.

TABLE 80.—Fertilizers, lime and manure on TRUCK CROPS, Washington County Truck Experiment Farm
Soil improvement, Series B, 1918

Plot	Treatment per acre for each crop*	Yield and increase in pounds per acre										Plot
		Sweet corn Block H		Cucumbers Block E		Cabbage Block F		Tomatoes Block G		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
21	Straw mulch	8,360	2,560	17,200	10,600	10,200	—840	8,940	—1,380	11,175	2,735	21
22	Unfertilized	5,800	.....	6,600	.....	11,040	.....	10,320	.....	8,440	.....	22
23	Manure, 16 tons; acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	10,360	4,380	10,720	4,400	21,200	7,940	20,000	9,715	15,520	6,609	23
24	Manure, 16 tons	10,560	4,580	9,040	2,720	20,600	7,340	17,810	7,525	14,502	5,541	24
25	Manure, 16 tons; ground limestone, 1 ton	10,720	4,740	11,900	5,580	23,280	10,020	18,880	8,595	16,195	7,234	25
26	Manure, 16 T.; acid phos., 400 lb.; nit. soda, 160 lb.; ground limestone, 1 T.	11,040	5,060	11,160	4,840	23,440	10,180	19,340	9,055	16,245	7,284	26
27	Manure, 16 tons	10,040	4,060	8,190	1,870	21,240	7,980	17,300	7,015	14,192	5,231	27
28	Manure, 16 tons; acid phos., 400 lb.; ground limestone, 1 ton.	11,240	5,260	8,180	1,860	23,400	10,140	19,140	8,855	15,490	6,529	28
29	Unfertilized	6,160	.....	6,040	.....	15,480	.....	10,250	.....	9,482	.....	29
30	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	8,400	2,800	11,820	5,023	16,000	1,547	14,090	4,497	12,577	3,467	30
31	Acid phos., 500 lb.; mur. potash, 50 lb.; nitrate soda, 160 lb.; ground limestone, 1 ton	8,880	3,840	9,370	1,817	18,880	5,453	12,790	3,853	12,480	3,741	31
32	Unfertilized	4,480	.....	8,310	.....	12,400	.....	8,280	.....	8,367	.....	32
33	Ground limestone, 1 ton	6,400	1,893	6,040	—1,123	16,040	3,680	8,630	150	9,277	1,150	33
34	Acid phosphate, 400 lb.; nitrate soda, 160 lb.; ground limestone, 1 ton.	7,600	3,067	6,550	533	18,220	5,900	14,460	5,780	11,707	3,820	34
35	Unfertilized	4,560	.....	4,870	.....	12,280	.....	8,880	.....	7,647	.....	35
36	Acid phos., 400 lb.; ground limestone, 1 ton	7,120	2,560	4,790	—80	15,640	3,360	12,260	3,380	9,952	2,305	36
	Average of check plots 22, 29	5,980	.....	6,320	.....	13,260	.....	10,285	.....	8,961	.....	
	Average of check plots 29, 32 and 35	5,067	.....	6,407	.....	13,387	.....	9,137	.....	8,499	.....	

*Plots 22 to 28, inclusive, receive a cover crop of rye, and Plots 29 to 36, inclusive, receive a cover crop of cowpeas after each crop except cucumbers.

TABLE 81.—Fertilizers, lime and manure on TRUCK CROPS, Washington County Truck Experiment Farm
Soil improvement, Series B, 1919

Plot	Treatment per acre	Yield and increase in pounds per acre										Plot
		Sweet corn Block E		Cucumbers Block F		Cabbage Block G		Tomatoes Block H		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
21	Straw mulch	4,200	—800	16,270	2,450	8,800	4,920	5,800	—730	8,767	1,465	21
22	Unfertilized	5,000	.....	13,820	.....	13,720	.....	5,070	.....	9,402	.....	22
23	Manure, 16 tons; acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	7,920	2,380	17,140	—490	23,920	10,340	11,460	5,415	15,110	4,411	23
24	Manure, 16 tons	7,880	2,340	20,640	3,010	22,080	8,500	13,000	6,955	15,900	5,201	24
25	Manure, 16 tons, ground limestone, 1 ton	8,160	2,620	25,540	7,910	25,040	11,460	12,940	6,895	17,920	7,221	25
26	Manure, 16 tons; acid phos., 400 lb.; nit. soda, 160 lb.; ground limestone, 1 T.	8,320	2,780	24,150	6,520	25,400	11,820	12,430	6,385	17,575	6,876	26
27	Manure, 16 tons	7,920	2,380	21,940	4,310	21,840	8,260	12,420	6,375	16,030	5,331	27
28	Manure, 16 tons; acid phosphate, 400 lb.; ground limestone, 1 ton	8,880	3,340	26,880	9,250	20,440	6,860	12,650	6,605	17,212	6,514	28
29	Unfertilized	6,080	.....	21,440	.....	13,440	.....	7,020	.....	11,995	.....	29
30	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	6,560	347	27,760	6,647	18,920	5,987	7,580	1,487	15,205	3,617	30
31	Acid phos., 400 lb.; mur. pot., 50 lb. nit. soda, 160 lb.; ground limestone, 1 ton	6,880	533	27,980	7,193	24,440	12,013	7,060	1,893	16,590	5,408	31
32	Unfertilized	6,480	.....	20,460	.....	11,920	.....	4,240	.....	10,775	.....	32
33	Ground limestone, 1 ton. Cover crop	6,200	240	17,280	—2,727	14,920	3,400	3,760	—87	10,540	206	33
34	Acid phos., 400 lb.; nit. soda, 160 lb.; ground limestone, 1 ton	5,920	480	16,200	—3,353	18,220	7,100	5,940	2,487	11,570	1,678	34
35	Unfertilized	4,920	.....	19,100	.....	10,720	.....	3,060	.....	9,450	.....	35
36	Acid phosphate, 400 lb.; ground limestone, 1 ton	4,800	—120	19,300	200	14,320	3,600	4,490	1,430	10,727	1,277	36
	Average of check plots 22 and 29	5,540	.....	17,630	.....	13,580	.....	6,045	.....	10,699	.....	
	Average of check plots 29, 32 and 35	5,827	.....	20,333	.....	12,027	.....	4,773	.....	10,740	.....	

*Plots 22 to 28, inclusive, receive a cover crop of rye, and Plots 29 to 36, inclusive, receive a cover crop of cowpeas after each crop except cucumbers, which are followed by the rye cover crop. The cover crops are additional to other treatments.

TABLE 82.—Fertilizers, lime and manure on TRUCK CROPS, Washington County Truck Experiment Farm
Soil improvement, Series B, 5-year average, 1915-1919

Plot	Treatment per acre for each crop*	Yield and increase in pounds per acre										Plot
		Sweet Corn		Cucumbers		Cabbage		Tomatoes		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
21	Straw mulch	6,112	592	12,390	3,556	13,696	—416	8,316	—794	10,128	734	21
22	Unfertilized	5,520	.....	8,834	.....	14,112	.....	9,110	.....	9,394	.....	22
23	Manure, 16 tons; acid phos., 400 lb.; mur. potash, 50 lb.; nitrate soda, 160 lb.	7,888	2,008	16,232	5,916	23,464	9,088	14,734	5,610	15,579	5,655	23
24	Manure, 16 tons	7,828	1,948	14,676	4,360	20,936	6,560	14,642	5,518	14,520	4,596	24
25	Manure, 16 tons; limestone, 1 ton	8,204	2,324	16,172	5,856	22,016	7,640	14,880	5,756	15,318	5,394	25
26	Manure, 16 tons; acid phos., 400 lb. nitrate soda, 160 lb.; limestone, 1 ton	8,356	2,476	19,486	9,170	24,096	9,720	14,262	5,138	16,550	6,626	26
27	Manure, 16 tons	7,948	2,068	15,430	5,114	20,016	5,640	14,220	4,996	14,376	4,454	27
28	Manure, 16 tons; acid phos. 400 lb.; limestone, 1 ton	8,564	2,684	17,826	7,510	21,208	6,832	14,764	5,640	15,590	5,666	28
29	Unfertilized	6,240	.....	11,798	.....	14,640	.....	9,138	.....	10,454	.....	29
30	Acid phos., 400 lb.; mur. potash, 56 lb.; nitrate soda, 160 lb.	7,384	1,219	17,760	5,990	19,320	5,195	10,616	2,236	13,770	3,660	30
31	Acid phos., 400 lb.; mur. potash, 50 lb.; nitrate soda, 160 lb.; limestone, 1 ton	7,792	1,701	17,450	5,708	21,984	8,373	9,942	2,318	14,292	4,525	31
32	Unfertilized	6,016	.....	11,714	.....	13,096	.....	6,866	.....	9,423	.....	32
33	Limestone, 1 ton	6,560	732	11,532	548	16,344	3,763	7,646	699	10,520	1,435	33
34	Acid phos., 400 lb. nitrate soda, 160 lb; limestone, 1 ton	7,140	1,500	13,694	3,440	20,264	8,197	10,326	3,299	12,856	4,109	34
35	Unfertilized	5,452	.....	9,524	.....	11,552	.....	7,108	.....	8,409	.....	35
36	Acid phos., 400 lb.; nitrate soda, 160 lb.; limestone, 1 ton	6,460	1,008	10,598	1,074	15,536	3,984	8,966	1,858	10,390	1,981	36
	Average of check of lots 22, and 29	5,880	.....	10,316	.....	14,376	.....	9,124	.....	9,924	.....	
	Average of check of lots 29, 32 and 35	5,903	.....	11,012	.....	13,096	.....	7,704	.....	9,429	.....	

*Plots 22 to 28, inclusive, receive a cover crop of rye, and Plots 29 to 36, inclusive, receive a cover crop of cowpeas after each crop except cucumbers which receive the rye cover crop. The cover crops are additional to other treatments.

TABLE 83.—Average annual value of TRUCK CROPS, Washington County Truck Experiment Farm. Increase due to treatment and net gain or loss per acre

Plot	Treatment per acre	Average value* Dollars	Increased value Dollars	Cost of treatment Dollars	Net gain Dollars
	Soil fertility series: Basic treatment, limestone				
1	Unfertilized	230.16			
2	Shed manure, 16 tons; acid phos., 400 lb.	289.82	62.72	46.00	16.72
3	Shed manure, 16 tons	274.06	50.00	40.00	10.00
4	Unfertilized	221.00			
5	City manure, 16 tons	268.64	47.62	40.00	7.62
6	Acid phos., 800 lb.; mur. potash, 100 lb.; nit. soda, 320 lb.	286.30	63.24	35.50	27.74
7	Unfertilized	221.08			
8	Acid phos., 400 lb.; mur. potash, 50 lb.; nit soda, 160 lb.	266.46	45.50	17.75	27.75
9	Acid phosphate, 400 lb.; nitrate soda, 160 lb.	272.00	51.16	14.00	37.16
10	Unfertilized	220.72			
11	Acid phosphate, 400 lb	254.04	34.80	6.00	28.80
12	Nitrate soda, 80 lb.; sulphate ammonia, 65 lb.	228.10	10.34	8.00	2.34
14	Unfertilized	216.26			
14	Nitrate soda, 160 lb. (in 2 applications)	221.98	9.34	8.00	1.34
15	Nitrate soda, 160 lb. (in 1 application)	227.64	18.62	8.00	10.62
16	Unfertilized	205.40			
	Average value from basic treatments only†	219.10			
	Soil improvement series: Basic treatment, cover crop				
21	Straw mulch	202.56	14.68		
22	Unfertilized	187.88			
23	Manure, 16 tons,; acid phos., 400 lb.; mur. pot., 50 lb.; nit. soda, 160 lb.	311.58	113.10	57.75	55.35
24	Manure, 16 tons	290.40	91.92	40.00	51.92
25	Manure, 16 tons; limestone, 1 ton	306.36	107.88	46.00	61.88
26	Manure, 16 tons; acid phos., 400 lb.; nit. soda, 160 lb.; limestone, 1 ton	331.00	132.52	60.00	62.52
27	Manure, 16 tons	287.56	89.08	40.00	49.08
28	Manure, 16 tons; acid phos., 400 lb.; limestone, 1 ton	311.80	113.32	52.00	61.32
29	Unfertilized	209.08			
30	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	275.40	73.20	17.75	55.45
31 32	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.; limestone, 1 ton	285.84	90.50	23.75	66.75
	Unfertilized	188.46			
33	Limestone, 1 ton	210.40	28.70	6.00	22.70
34	Acid phos., 400 lb.; nit. soda, 160 lb.; limestone, 1 ton	257.12	82.18	20.00	62.18
35	Unfertilized	168.18			
36	Acid phos., 400 lb.; limestone, 1 ton	207.80	39.62	12.00	17.62
	Average value from basic treanment only‡	188.40			

*During the season of 1917, 1918 and 1919 sweet corn sold at average prices equivalent to 1¾, 3 and 3 cents a pound, respectively; cucumbers at 1, 2.8 and 1.8 cents; cabbage at 1.4, 4.2 and 2.9 cents and tomatoes at 3, 3.4 and 5.6 cents. Taking the total weights of the 4 crops and the total receipts from the sales the average for the period amounts to 2½ cents a pound. Allowing ½ cent a pound for marketing, the average annual values at the farm are computed at 2 cents a pound.

†Plots 1 to 16, inclusive, receive as basic treatment 2 tons of finely-ground limestone spread over all the land every second season, together with cover crops.

‡The basic treatment in this series consists in a cover crop of rye grown after every crop on Plots 22 to 28, inclusive, and after cucumbers on Plots 29 to 36 also. On Plots 29 to 36 cowpeas are grown as a cover crop after sweet corn, cabbage and tomatoes.

BULLETIN
OF THE
Ohio Agricultural Experiment Station
NUMBER 344 JUNE, 1920

COUNTY EXPERIMENT FARMS IN OHIO

PART VI

THE TRUMBULL COUNTY EXPERIMENT FARM

FOURTH AND FIFTH ANNUAL REPORTS FOR 1918 AND 1919

CHARLES E. THORNE, DIRECTOR

CARY W. MONTGOMERY, CHIEF

M. O. BUGBY AND J. P. MARKLEY, SUPERINTENDENTS
D. E. WOODFORD, FOREMAN

PERSONNEL

In October, 1918, M. O. Bugby resigned as superintendent and was succeeded by J. P. Markley. D. E. Woodford resigned as foreman February 1, 1920, and was succeeded by John H. Welday March 1, 1920.

INVENTORY AND FINANCIAL SUMMARY

March 1, 1919

Original cost: land and buildings		$15,388.00
Permanent Improvements to March 1, 1918		6,984.31
Permanent Improvements made in 1918:		
Improvements on dwellings	$ 34.65	
80 rods fence and gates	188.35	
		223.00
		$22,595.31
Operating equipment:		
Livestock: 2 horses and 1 colt, $500; cattle, $1,880	$2,380.00	
Machinery, tools and harness	1,530.00	
Equipment: orchard, $210; dairy, $131; water supply $425	766.00	
Crops and seeds: corn, $105; oats, $459; wheat, $27; silage, $150; straw, $207.30; hay, $500; mill feed, $6.50; soybean seed, $40; alsike seed, $4; timothy seed, $2; rye, $15; sweet clover, $15	1,530.80	
Fertilizers	75.00	
Containers	29.75	
Sundries: gravel, $20; posts, $15; wire, $5; tile, $2; twine, $5.25; oil, $12.75	60.00	
Total operating equipment		6,371.55
Total investment		$28,966.86

March 1, 1920

Original Cost: land and buildings		$15,388.00
Permanent Improvements to March 1, 1919		7,207.31
Permanent Improvements made in 1919:		
Foundation for granary: cement, gravel and sand		157.60
Total permanent investment		$22,752.91
Operating Equipment:		
Livestock: 4 horses, $710; cattle, $2,360	$3,070.00	
Machinery, tools and harness	1,558.75	
Crops and feeds: corn, $240; oats, $13.50; potatoes, $30; silage, $400; wheat, $22; hay, $480; straw, $225; bran, $96; oilmeal, $21.25	1,527.75	
Seeds: clover, $19; alsike, $13; alfalfa, $8; timothy, $8	48.00	
Water system equipment	400.00	
Dairy equipment	121.50	
Fertilizers and lime	62.50	
Gravel	20.00	
Sundries: barb wire, $5; containers, $30	35.00	
Total operating equipment		6,843.50
Total investment		$29,596.41

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1919

To Receipts

Dr.

From County:		
Balance in Treasury March 1, 1918	$ 337.73	
Maintenance fund distribution	2,000.00	
		$2,337.73
From Farm Sales:		
Livestock and livestock products: horses, $270; cattle, $355; calves and hides, $69.75; milk, $2,931.14	3,625.89	
Crops: potatoes, $15; wheat, $203.30; seeds and plants, $530.53	748.83	
Sundries: labor, $18.80; containers, $3; junk, $5.25	27.05	
		4,401.77
Total receipts		$6,739.50

Cr.

By Expenditures

For labor	$2,521.24	
For Current Expenses: seeds and plants, $115.75; feeds, $976.69; fertilizer, $548.18; binding material, $51.95; containers, 25 cents; machine hire, $30; livestock equipment, $3.50; livestock fees, $12; veterinary service, $14.30; horse shoeing, $25.50; incidentals, $4.05; building maintenance, $47.45; water supply maintenance, $4.70; drainage maintenance, $1.90; fence maintenance, $5.25; implement maintenance, $45.58; engine maintenance, $194.29; transportation, $41.33; communication, $75.85; publicity, $1; miscellaneous hardware, $16.15; rent house and land, $125.25	2,343.92	
For Permanent Improvements: building material and construction, $11.35; water supply, $9; drainage, $5.50; fence, $84.26; permanent planting (ornamental), $11.22	121.33	
For machinery and tools, $9.50; motor equipment, $94.35	103.85	
For livestock: cattle	1,129.48	
Total expenditures		$6,219.82
Balance in County Treasury February 28, 1919		519.68
		$6,739.50

RECEIPTS AND EXPENDITURES

For the year ending February 29, 1920

Dr.

To Receipts

From County Treasury:		
Appropriations for year		$2,000.00
From Farm Sales:		
Livestock and livestock products: cattle, $130; calves, $235.78; milk, $3,402.94	$3,768.72	
Crops: oats, $238.32; wheat, $1,817.79; rye, $145.60; soybeans, $10.75; seeds and plants, $19.20	2,231.66	
Sundries: labor, $1; machine hire, $6; house rent, $80	87.00	
Total receipts		$6,087.38
To balance forward March 1, 1919		457.80
		$8,545.18

Cr

By Expenditures

For Labor	$2,976.25	
For Current Expenses:		
Seeds, $171.80; fertilizer and lime, $370.55; containers, 50 cents; binding material, $57; machine hire, $50; plot fixtures, $1.90; feeds, $966.57; horse shoeing, $19.90; livestock equipment, $20.30; veterinary, $10.45; livestock fees, $12; livestock incidentals, $18.66; building repair, $74.83; water supply maintenance, $1; implement repair, $110; drainage maintenance, $9.93; fence maintenance, 30 cents; engine maintenance, $214.37; transportation, $74.91; communication, $40.85; publicity, $2; miscellaneous hardware, $26.65	2,254.47	
For Permanent Improvements:		
Concrete and masonry, $16.39; slag, 50 cents	16.89	
For Machinery, tools and harness	157.10	
For Livestock: horses, $164; cattle, $156.21	320.21	
Total expenses		$5,724.92
To balance forward February 29, 1920		2,820.26
		$8,545.18

CROP AND LABOR STATISTICS, 1918

Area in Farm	152.2 A.	Permanent pasture	38.72 A.
Area in Farmstead	4. A.	Roads (public)	6.5 A.
Area cultivated	88.55 A.	Roads and alleys (farm)	12.43 A.
Orchard	3. A.		

Plot Work	No. of plots	Total area (acres)	Total yield (pounds)	Yield per acre		
				Average	Highest	Lowest
Corn	65⅔	6.07	13,502	31.78 bu.	42.06 bu.	14.21 bu.
Silage (corn)	46⅓	3.23	47,335	7.33 tons	10.75 tons	4.15 bu.
Silage (pea and oats)	1	.1	1,145	5.73 tons		
Silage (rye)	2	.2	1,195	3. tons	3.45 tons	2.5 bu.
Oats	81	10.77	25,762	74.75 bu.	100.31 bu.	33.12 bu.
Barley	1	.1	169	35.21 bu.		
Emmer	1	.1	109	34.06 bu.		
Soybeans	13	1.3	674	8.64 bu.	12.67 bu.	4.92 bu.
Potatoes	21	1.34	3,745	46.58 bu.	115. bu.	13.75 bu.
Wheat (winter)	73	6.52	11,385	28.75 bu.	47.25 bu.	6.83 bu.
Wheat (spring)	6	.35	370	17.62 bu.	28.83 bu.	7.83 bu.
Rye	7	.45	581	23. bu.	38.32 bu.	6.43 bu.
Hay (mixed)	39	4.39	15,410	1.76 tons	3.73 tons	.33 tons
Hay (soybean)	3	.3	585	.98 tons	1.13 tons	.88 tons
Hay (alfalfa)	5	1.67	7,520	2.19 tons	2.96 tons	1.29 tons
Total plots	365	36.89				
Field Work						
Corn (alley)		.07	67			
Corn (sweet)		.5	Fed to cows			
Silage (corn)		12.17	147,165	6.06 tons		
Silage (oats and peas)		1.5	17,990	6. tons		
Oats		10.69	13,697	40.05 bu.		
Soybeans		.2	100	8.29 bu.		
Potatoes		.43	1,150	44.57 bu.		
Wheat (winter)		6.62	12,932	32.56 bu.		
Wheat (spring)		.33	381	19.24 bu.		
Hay (mixed)		19 149	100,135	2.57 tons		
Hay (soybean)		3.5	8,870	1.27 tons		
Hay (roads east and west)		3.5	8,325			
Total field acres		55.5				
Total crop acres		92.39				
Less crops on roads and alleys		3.84				
Total cultivated area		88.55				

		Silage				
	Corn bu.	Corn ton.	Rye ton.	Oats bu.	Soys bu.	Potatoes bu.
Highest yielding plots per acre	42.06	10.75	3.48	100.31	12.67	115.
Lowest yielding plots per acre	14.21	4.15	2.5	33.12	4.92	13.75

	Wheat			Hay		
	Winter bu.	Spring bu.	Rye bu.	Mixed tons	Soybean tons	Alfalfa tons
Highest yielding plots per acre	47.25	28.83	38.32	3.73	1.13	2.96
Lowest yielding plots per acre	6.83	7.83	6.43	.33	.88	1.29

Number of work horses used on Trumbull County Experiment Farm in 1918 .. 4
Number of crop acres per work horse 22.89
Number of man hours per year (March 1, 1918 to Feburary 28, 1919 inclusive) 9 965
Number of horse hours per year (March 1, 1918 to Feburary 28, 1919 inclusive) 4,351
Number of tractor hours per year (March 1, 1918 to Feburary 28, 1919 inclusive) 362

CROP AND LABOR STATISTICS, 1919

Area of farm .....153.2 A. Area cultivated.....100.35 A.
Other area undetermined

PLOT WORK	No. of plots	Total area (acres)	Total yield (pounds)	Yield per acre
Corn	53	5.3	23,625	63.67 bu.
Corn silage	36	2.6	55,225	10.62 tons
Oats	66	6.05	6,430	33.21 bu.
Barley	1	.1	92	19.17 bu.
Soybeans	2	.2	500	1.25 tons
Emmer	1	.1	72	22.50 bu.
Spring wheat	9	.5	253	8.6 bu.
Rye	6	.4	642	28.66 bu.
Potatoes	12	.7	2,136	50.86 bu.
Wheat	78	9.1	18,457	33.8 bu.
Rye silage	2	.2	1,450	3.625 tons
Clover	38	4.16	12,525	1.5 tons
Alfalfa	14	2.21	20,905	4.73 tons
Oat and pea hay	2	.2	350	.875 tons
Timothy	1	.1	515	2.575 tons
Total plots and plot acres	321	31.92		

FIELD WORK			
Corn	3.026	6,867	32.42 bu.
Corn silage	9.330	221,320	1.186 tons
Oats	6.590	unharvested	
Oats	.066	69	32.34 bu.
Rye	8.350	8,400	17.96 bu.
Pea and oat silage	5.330	39,660	3.72 tons
Wheat	20.180	36,334	30. bu.
Alfalfa	.1125	unharvested	
Alfalfa	1,040	3,070	2.4 tons
Clover	4.	unharvested	
Clover	10.40	41,090	2.06 tons
Total field acres			

						Hay
	Corn bu.	Silage tons	Oats bu.	Potatoes bu.	Wheat bu.	Mixed tons
Highest yielding plots per acre	91.	19.9	50.62	93.17	44.	2.89
Lowest yielding plots per acre	25.55	6.35	25.94	18.6	16.5	.64

			Hay	
	Rye bu.	Rye silage ton	Alfalfa tons	Soybean tons
Highest yielding plots per acre	33.4	3.12	3.83	1.1
Lowest yielding plots per acre	25.71	3.12	2.47	1.0

Number of work horses used on Trumbull County Experiment Farm 4
Number of crop acres per work horse 25.12
Number of man hours per year, (March 1 to February 29, inclusive) 11,493
Number of horse hours per year, (March 1 to February 29, inclusive) 4,886

FARM WORK AND IMPROVEMENTS, 1918 AND 1919

J. P. MARKLEY

CLIMATIC CONDITIONS

The climatic conditions were favorable to crop production during the spring and summer of 1918. A killing frost on the night of September 30 did considerable damage to the corn and late potato crop.

Excessive rainfall in the spring of 1919 delayed oat seeding and corn planting. Following the heavy spring rains was a period during June and July with the rainfall below normal. These weather conditions caused a very light oat crop. There was an abundance of rain later in the season, the precipitation for August, September and October was far above normal, a condition favorable to the growing corn crop but not so for threshing, especially for the harvesting and threshing of the buckwheat, a crop of which there was a large acreage grown in the county.

PASTURE EXPERIMENTS

As dairy farming is one of the leading enterprises of the county and as good pasture is one of the main factors in lowering the cost of milk production, it would seem to be a part of the work of the local experiment farm to conduct experiments for studying methods of pasture improvement. With this aim in view, a block (A), consisting of eleven one-tenth acre plots, was laid out in the east pasture, along the public road. Numbering from the north they were treated as follows: Plot 1, manure at the rate of 4 tons per acre; Plot 2, manure 4 tons and ground limestone 2 tons per acre; Plot 3, check; Plot 4, manure 4 tons and acid phosphate 240 pounds per acre; Plot 5, manure 4 tons, acid phosphate 240 pounds and ground limestone 2 tons per acre; Plot 6, plowed and fertilized at the rate of 240 pounds of acid phosphate and 2 tons of ground limestone per acre and seeded; Plot 7, disked and treated the same at Plot 6; Plot 8, check; Plot 9, 240 pounds of acid phosphate per acre; Plot 10, 2 tons of ground limestone per acre; Plot 11, straw mulch.

The grass seed mixture and rate of seeding Plots 6 and 7 was as follows: 4 pounds each of timothy, orchard grass, red top and alsike clover, 6 pounds of bluegrass and 2 pounds of alfalfa per acre.

On account of the dry weather after seeding the stand of grass is uneven and it will probably be necessary to reseed these plots.

This experiment is duplicated in Block B, which is located in another part of the same field where the soil is less fertile.

Block 1, Plots 1, 2, 4, 5 and 6 were manured in 1918, the year preceding the one in which this experiment was started.

SUMMARY DAIRY REPORT

March 1, 1918, to February 28, 1919

DEBITS		CREDITS	
Inventory March 1, 1918:		Inventory February 28, 1919:	
Item	Value	Item	Value
Dairy barn*	$1,200.00	Dairy barn*	$1,200.00
Two silos	500.00	2 silos	500.00
Milk house	400.00	Milk house	400.00
Water supply equipment	200.00	Water supply equipment	200.00
Dairy equipment	132.00	Dairy equipment	131.00
14 cows	1,415.00	14 cows	1,480.00
1 bull	100.00	2 bulls	200.00
7 calves	200.00	5 calves	100.00
5 heifers	270.00	8 heifers	500.00
Total inventory	$4,417.00	Total inventory	$4,711.00
Man labor, 3,440 hrs. at 30c	1,032.00	Milk sold, 95,476 lbs.	2,901.92
Horse labor, 42 hrs. at 15c	6.30	Milk used, 2,802 lbs.	85.18
Feed consumed	1,947.16	Milk fed to calves, 921 lbs.	28.00
Pasture	224.60	2 calves sold	69.75
Milk fed to calves	28.00	2 cows sold	230.00
Hauling milk	159.71	2 heifers sold	125.00
Association dues	3.14	Manure produced	460.00
1.3 shares Dairy Co.-op. Co.	3.25		
Interest on investment†	270.84		
1 bull purchased	150.00		
Freight on same	13.60		
Supplies	11.03		
Veterinary bills	15.00		
Truck hire, 159 miles at 10c	15.90		
To balance (gain)	313.32		
	$8,610.85		$8,610.85

Price of rough feeds: Hay, $20 per ton; corn silage, $6 per ton; pea and oat silage, $5 per ton; rye silage, $4 per ton; corn stover, $4 per ton.

March 1, 1919, to February 29, 1920

Dairy barn*	$1,200.00	Dairy barn*	$1,200.00
2 silos	500.00	2 silos	500.00
Milk house	400.00	Milk house	400.00
Water supply equipment	200.00	Water supply equipment	200.00
Dairy equipment	131.00	Dairy equipment	121.50
14 cows	1,480.00	14 cows	1,500.00
2 bulls	200.00	1 bull	150.00
5 calves	100.00	3 calves	60.00
8 heifers	500.00	11 heifers	650.00
Total inventory	$4,711.00	Total inventory	$4,781.50
Man labor, 3,794½ hrs. at 30c	1,141.75	Milk sold, 111,514 lbs.	3,600.36
Horse labor, 213 hrs. at 15c	31.95	Milk sold, 101½ qts. at 8c	88.12
Feed consumed	2,811.95	Milk used, 2,616 lbs.	86.31
Pasture	193.07	Milk fed to calves, 5,764 lbs.	174.43
Milk fed to calves	174.43	8 calves sold	260.58
Hauling milk	198.04	1 heifer sold	60.00
Association dues	11.14	1 bull sold	70.00
Interest on investment†	287.77	1 cow sold	65.00
Supplies	18.91	Manure produced	524.86
Veterinary bills	5.00		
Truck hire, 179 miles at 10c	17.90		
Milk testing	20.00		
To balance (gain)	8.25		
	$9,631.16		$9,631.16

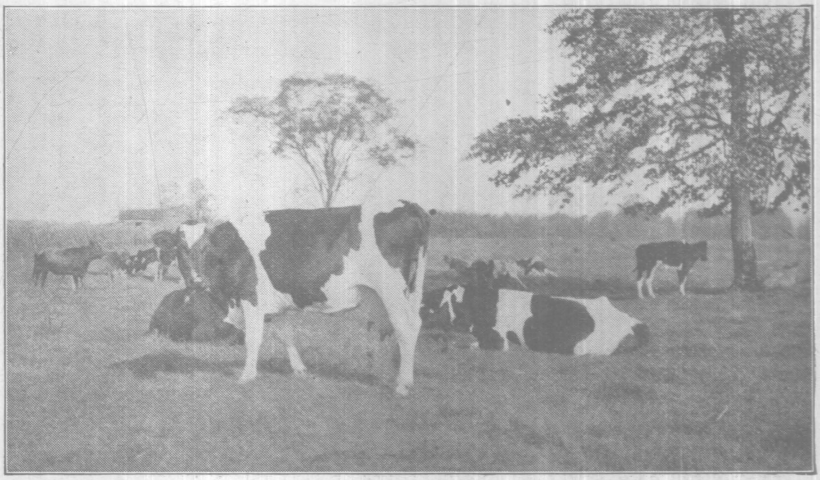
Price of rough feeds: Hay, $20 per ton; corn silage, $8 per ton; corn stover, $4 per ton; pea and oat silage, $6 per ton.

*As a part of the barn is used for other purposes but four-fifths of the total value is charged to the dairy.

†The interest on investment was figured at 6 percent on the average of inventories.

Price of grain: The price used for grain was the cost price of that purchased and the farm price each month for grain grown on the farm.

The value of manure was figured as follows: For every 1,000 pounds live weight it was estimated that 12,600 pounds of manure were produced for the 6 months the cattle were fed in the barn; it was possible to save three-fourths of this and a ton of manure is estimated to be worth $3.80 for crop production. For the 6 months the cattle were on pasture the amount of manure was figured the same but was given a value of $1 per ton for the improvement of the pasture.



Trumbull County Experiment Farm dairy herd on pasture

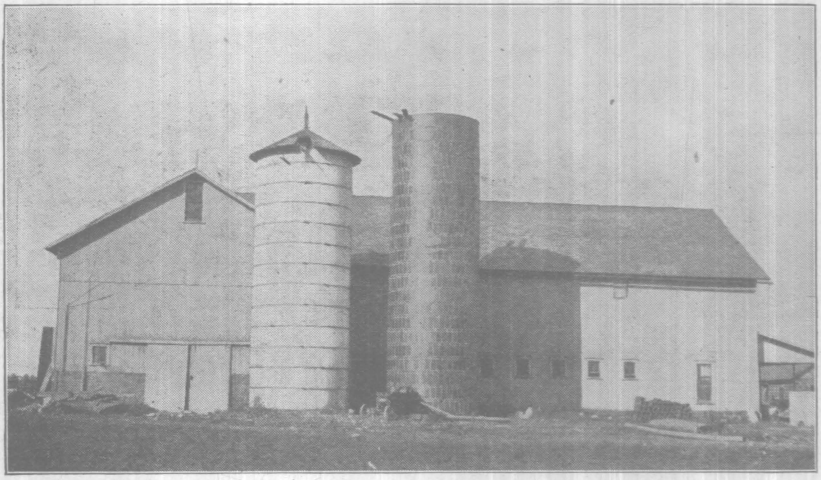
(It will be observed that in these reports no allowance is made for superintendence, and that the profit has consisted chiefly in the manure produced. The farmer who owns his land and operates such a dairy as this would have a convenient market for the disposal of the produce of his land, might realize interest on his investment in stock and equipment, and would have steady employment for himself, although at wages considerably below the prevailing rate—in fact it has been extremely difficult to keep sufficient help to operate this dairy in face of the demand for labor in the nearby cities—but these records leave no margin for profit on purchased feeds or on hired labor. The Director.)

DRAINAGE

More fertilizers and lime are being used and better care is taken of manure, to prevent loss of the fertilizing elements, as the farmers of the county come to realize more fully their value. But it is a waste of money and labor to apply lime and fertilizer to land

that will not grow a good crop on account of lack of drainage. There are thousands of acres of land in Trumbull County that will not produce the profitable crops that they should until they have been tile drained.

There is a difference of opinion among farmers of the county with regard to the depth and distance apart tile drains should be laid. A block of 10 plots on the experiment farm is devoted to a tile drainage experiment and an attempt is being made to help solve these drainage problems. In 1918 the difference between the average yield of oats on the drained and undrained plots was 14 bushels per acre in favor of drainage. The average wheat yield for 1919 on the drained plots was 35 bushels and 50 pounds per acre and on the undrained plots 25 bushels per acre.



Barn and silos on Trumbull County Experiment Farm

It is too early in the experiment to draw definite conclusions as to the proper depth and distance apart tile drains should be laid.

SEED CORN SELECTION

There is a large acreage of corn grown in Trumbull County and as the average season for growing is short it is important that a variety of corn be grown that is adapted to this section. With the aim of developing a variety suited to this locality, work in seed selection was started in 1919. An early-maturing variety that has compared well with others in the variety test at the Experiment Farm, was selected and seed for starting the work was procured from a Trumbull County farmer who had grown this same variety successfully for nearly 50 years.

This corn was planted thick and thinned to three stalks in each hill. Seed was selected from the field before cutting and care was taken to select ears from stalks having only the desired qualities.

SPRING WHEAT

As the season of 1918 was favorable for the growing of spring wheat, satisfactory yields were reported from many sections of northern Ohio and it was thought by many that, if sown early in the spring and with the proper fertilization, spring wheat might be a profitable crop for the northern Ohio farmer to grow. The results obtained in an experiment at the Trumbull County Farm, in 1919, compare well with those of farmers throughout this section of the State.

Winter wheat, left; spring wheat, right. Trumbull County Experiment Farm

Seven plots of spring wheat, of the Marquis and Blue Ribbon varieties, were seeded at different dates ranging from March 26 to May 3. The highest yield was 14 bushels per acre and the lowest 4 bushels and 40 pounds per acre, with an average yield, for the seven plots, of 10 bushels per acre, less than one-third that of winter wheat on an adjoining block. There was very little marketable wheat harvested from the spring wheat block while the winter wheat was of a good grade.

EQUIPMENT

The only addition made to the farm equipment for the two years covered by this report was that of a grain separator. The

machine purchased was a used machine but in good repair; it is equipped with a self-feeder and wind stacker. The power for operating the thresher is furnished by an 8-16 tractor owned by the farm.

FIELD MEETINGS

The annual field meetings have brought large crowds of Trumbull County farmers, also many visitors from surrounding counties. At these meetings, which are held late in June, the forenoon is given over to an inspection of the farm and a program is arranged for the afternoon. Although the day was cold and rainy for the 1918 meeting several hundred farmers were present and a very interesting meeting was held in the dairy barn. For the 1919 meeting the weather was ideal and the crowd large. The parking of cars was in charge of the scout master of the Warren Boy Scouts. As the people arrived they were met by a committee of men and women who took their names and pinned on a name card. Getting acquainted was one of the features of the day.

An Experiment Farm exhibit was made at the Trumbull County fair and the results of this work were very satisfactory.

The success of both the field meetings and the fair exhibit was partly due to the close cooperation of the county agent and county farm bureau.

THE MAINTENANCE OF SOIL FERTILITY

DEPARTMENT OF SOILS

A 4-year rotation of corn, oats, wheat and clover was begun on this farm in 1915, corn being grown that year; corn, oats and wheat in 1916, and the 4 crops in 1917 and since. The corn crop of 1916 was frosted September 19 and was cut for silage, so that the following tables include only 4 crops of corn.

The plan of the experiment is shown in Table 84, and the yields for 1918 and 1919 and for the average of the 4 years are given in Tables 85 to 88.

For purposes of comparison the crops are valued at $1 a bushel for corn, 75 cents for oats, $2 for wheat and $20 a ton for hay. These values, of course, do not correspond exactly to the market at any time and place, but they serve the purpose of a relative comparison.

Referring to the plan of the experiment, it will be seen that the only land that receives no treatment is Plot 28. The total value of the four crops grown on this plot is $86, and the average value of the four crops grown on Plots 1, 4, 7, 10 and 13, which receive no other treatment than 2 tons of fine limestone on corn, is $142, indicating an increased value for the liming of $56.

Plots 16, 19, 22 and 25 receive no other treatment than 8 tons of manure per acre, half on corn and half on wheat, the manure being reinforced with acid phosphate, 60 pounds per ton of manure. The average total value of the four crops grown on this land is $145, which indicates an increase for the 8 tons of phosphated manure of $59.

Plots 15, 20 and 23 receive, respectively, fine limestone, quicklime and hydrated lime on the corn crop, in addition to the phosphated manure. The values attained on these plots are $169, $167 and $165, respectively, or $24, $22 and $20 more than the values produced by the phosphated manure alone. The limestone in these cases has been used at the rate of 1 ton per acre each on corn and wheat instead of 2 tons, all on corn, as in the comparison first mentioned. The wheat dressing has not yet had time to show its full effect.

Four tons of coarse limestone has thus far increased the yield by $14.

Acid phosphate used alone, 200 pounds per acre each on corn and wheat and 100 pounds on oats, has increased the value of the 4 crops of the rotation by $42 on unlimed land (Plot 27) and by $44 on limed land (Plot 2).

Untreated yard manure, 4 tons per acre each on corn and wheat, has increased the value by $19 on limed land (Plot 14), while the same quantity of manure, reinforced with acid phosphate, 60 pounds per ton of manure, has increased the yield on Plot 9 by $42, thus giving $23 as the increase from 480 pounds of acid phosphate, used on manure, as against $42 to $44 for 500 pounds of acid phosphate used alone.

The same quantity of manure, used on unlimed land and followed by 500 pounds of acid phosphate applied separately (Plot 26) has apparently increased the yield by $58, or practically the same increase as that indicated on Plots 16, 19, 22 and 25, and indicating a gain of $39 for the acid phosphate, or practically the same gain for acid phosphate as that shown by Plots 2 and 27. It seems probable, therefore, that the gain found on Plot 9 is abnormally low.

The addition of nitrate of soda and muriate of potash to the acid phosphate has in no case increased the yield sufficiently to cover the added cost.

TABLE 84.—Plan of fertilizing, Trumbull County Experiment Farm

Plot	On corn				On oats			On wheat			
	Acid phosphate	Muriate potash	Nitrate soda	Stall manure	Acid phosphate	Muriate potash	Nitrate soda	Acid phosphate	Muriate potash	Nitrate soda	Stall Manure
Basal treatment: Finely ground limestone over all, 2 tons per acre on corn											
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	200	.....	.....	.....	100	.....	.....	200	.....	.....	.....
3	200	15	.....	.....	100	10	.....	200	15	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	200	15	44	.....	100	10	22	200	15	44	.....
6	*400	.....	.....	.....	*200	.....	.....	*400	.....	.....	.....
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	375	80	260	.....	.....	.....	.....	375	80	160	.....
9	.....	.....	.....	†4 T.	.....	.....	.....	.....	.....	.....	†4 T.
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	.....	.....	.....	†8 T.	100	.....	.....	‡	40	60	.....
12	.....	40	.....	†4 T.	.....	.....	.....	.....	40	.....	†4 T.
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	.....	.....	.....	§4 T.	.....	.....	.....	.....	.....	.....	§4 T.
Basal treatment: Stall manure phosphated, 60 lb. acid phosphate per ton, 4 tons per acre on corn and wheat											
15	Fine limestone, 1 ton each on corn and wheat										
16	None										
17	Fine limestone, 2 tons on wheat										
18	Coarse limestone, 4 tons on corn, alternate rotations										
19	None										
20	Quicklime, 1 ton on corn										
21	Quicklime, 1 ton on wheat										
22	None										
23	Hydrated lime, 1 ton on corn										
24	Hydrated lime, 1 ton on wheat										
25	None										
26	200	.....	.....	§4 T.	100	.....	.....	200	.....	.....	§4 T.
27	200	.....	.....	.....	100	.....	.....	200	.....	.....	.....
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	*400	.....	.....	.....	*200	.....	.....	*400	.....	.....	.....
No basal treatment											

*Commercial 2-8-2.
†Manure phosphated, 60 lb. acid phosphate per ton of manure.
‡200 lb. steamed bonemeal.
§Manure untreated.

TABLE 85.—Fertilizers, lime and manure on CORN, in rotation with oats, wheat and clover, Trumbull County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on corn (Plots 1 to 14, fine limestone over all, 2 tons per acre) (Plots 15 to 25, stall manure phosphated over all, 4 tons per acre)	1915—Block B				1917—Block A				4-year Average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	20.71	1,350			49.43	1,900			33.27	1,937			1
2	Acid phosphate, 200 lb	24.07	1,550	2.38	167	58.00	1,950	7.67	117	36.98	2,137	4.14	225	2
3	Acid phosphate, 200 lb.; muriate potash, 15 lb.	24.57	1,700	1.91	283	59.86	2,150	8.62	383	38.23	2,137	5.81	250	3
4	None	23.64	1,450			52.14	1,700			32.00	1,862			4
5	Acid phos., 200 lb.; mur. potash, 15 lb.; nitrate soda, 44 lb.	28.21	1,650	3.07	150	61.29	2,050	11.24	317	36.61	2,087	4.82	217	5
6	Commercial 2-8-2, 400 lb	23.86	1,300	—2.78	—250	60 29	2,000	12.34	233	36.54	1,975	4.97	96	6
7	None	28.14	1,600			45 86	1,800			31.36	1,887			7
8	Acid phos., 375 lb.; mur. potash, 80 lb.; nit. soda, 260 lb.	28.36	1,600	—1.04	—67	64.71	2,500	16.90	617	42.82	2,475	9.93	496	8
9	Stall manure, phosphated, 4 tons	37.93	1,900	7.26	167	64.00	2,300	14.24	333	44.28	2,437	9.86	367	9
10	None	31.93	1,800			51.71	2,050			35.96	2,162			10
11	Stall manure phosphated, 8 tons	35.43	1,750	5.19	—17	68.86•	2,400	17.62	400	47.09	2,600	12.45	496	11
12	Stall manure phosphated, 4 tons; mur. potash, 40 lb.	37.07	1,600	8.52	—133	71.71	2,200	20.95	250	43.95	2,312	10.63	267	12
13	None	26.86	1,700			50.29	1,900			32.00	1,987			13
14	Stall manure, untreated, 4 tons	26.64	1,400	—.22	—300	56.00	2 600	5.71	700	34.80	2,025	2.80	37	14
15	Limestone fine, 1 ton	40.14	2,240	5.35	500	61.29	2,250	3.15	—50	39.07	2,510	3.96	250	15
16	None	34.79	1,740			58.14	2,300			35.11	2,260			16
17	(Limestone on wheat)	32.93	1,680	—3.00	—87	62.14	2,200	3.95	33	†33.66	2,082	.47	—27	17
18	Coarse limestone, 4 tons*	39.71	1,740	2.64	—53	63.71	3,100	5.47	1,067	36.09	2,192	1.18	143	18
19	None	38.21	1,820			58.29	1,900			34.80	1,943			19
20	Caustic lime, 1 ton	40.93	2,030	4.08	217	67.29	2,650	11.33	667	38.77	2,332	5.40	396	20
21	(Caustic lime on wheat)	33.93	1,800	—1.57	—7	59.14	2,600	5.52	533	†31.66	1,950	1.97	263	21
22	None	34.14	1,800			51.29	2,150			30.50	1,925			22
23	Hydrated lime, 1 ton	38.43	1,850	5.50	100	61.71	2,600	9.04	433	38.78	2,237	8.62	292	23
24	(Hydrated lime on wheat)	32.86	1,800	1.15	100	58.59	2,650	4.52	467	†31.14	2,164	2.83	283	24
25	None	30.50	1,650			55.43	2,200			29.48	1,987			25
26	Untreated manure, 4 tons; acid phosphate, 200 lb.	25.43	1,620	13.22	780	48.00	2,000	18.57	300	28.62	1,780	13.28	470	26
27	Acid phosphate, 200 lb	14.64	1,150	2.43	310	51.29	2,400	21.86	700	26.54	1,775	11.19	465	27
28	None	12.21	840			29.43	1,700			15.34	1,310			29
29	Commercial 2-8-2, 400 lb	17.43	910	5.22	70	55.43	2,450	26.00	750	28.11	1,677	12.77	367	28
	Average yield of checks 1, 4, 7, 10, 13	26.26	1,580			49.89	1,870			32.92	1,963			
	Average yield of checks 16, 19, 22, 25	34.41	1,750			55.79	2,237			32.47	2,053			

*On corn, alternate rotations
†2-year average.

TABLE 86.—Fertilizers, lime and manure on OATS in rotation with corn, wheat and clover, Trumbull County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on oats (See basal treatment, Table 84)	1918—Block C				1919—Block B				4-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	61.87	3,270			34.37	1,050			45.11	2,946			1
2	Acid phosphate, 100 lb	73.44	2,900	15.27	12	47.19	1,490	9.69	223	51.01	2,555	6.45	—320	2
3	Acid phosphate, 100 lb.; muriate potash, 10 lb	71.25	2,820	16.77	313	50.62	1,630	10.00	147	53.28	2,932	9.26	128	3
4	None	50.78	2,125			43.75	1,700			43.47	2,734			4
5	Acid phos., 100 lb.; mur. potash, 10 lb.; nitrate soda, 22 lb.	72.19	2,740	20.73	570	46.87	1,750	6.25	217	54.76	2,572	11.30	—32	5
6	Commercial 2-8-2, 200 lb	70.31	2,700	18.18	485	35.00	1,330	—2.50	—37	51.68	2,396	8.23	—80	6
7	None	52.81	2,260			34.37	1,200			43.43	2,347			7
8	(Fertilizer only on corn and wheat)	65.94	2,890	13.70	612	30.94	1,660	—.62	437	47.07	2,706	4.00	343	8
9	(Phosphated manure on corn and wheat)	62.81	2,690	11.15	393	34.37	1,600	5.62	353	50.58	2,706	7.88	327	9
10	None	51.09	2,315			25.94	1,270			42.34	2,395			10
11	Acid phosphate, 100 lb. (phosphated manure on corn)	81.25	3,150	29.48	940	37.50	1,800	10.70	523	56.60	2,801	14.72	308	11
12	(Phosphated manure on corn and wheat)	64.84	2,625	12.40	520	35.00	1,430	7.39	147	50.51	2,959	9.07	368	12
13	None	53.12	2,000			28.44	1,290			40.98	2,689			13
14	(Untreated manure on corn and wheat)	55.78	2,215	2.66	215	29.69	1,050	1.25	—240	41.05	2,811	.08	122	14
15	(Fine limestone on corn)	60.31	2,370	9.53	245	41.25	2,180	1.88	340	47.81	2,745	3.24	134	15
16	None	50.78	2,125			39.37	1,840			44.57	2,611			16
17	(Fine limestone on wheat)	50.47	1,885			41.87	1,910	5.73	100	44.57	2,499	*5.73	100	17
18	(Coarse limestone on corn)	49.22	2,125	—4.58	—137	40.00	1,970	7.08	190	42.89	2,877	—.30	230	18
19	None	55.31	2,330			29.69	1,750			42.50	2,815			19
20	(Caustic lime on corn)	59.37	2,100	5.26	—118	32.81	1,950	2.81	193	45.74	2,599	3.94	—64	20
21	(Caustic lime on wheat)	53.75	1,980			34.37	1,650	4.06	—113	42.42	2,555	*4.06	—113	21
22	None	51.72	1,995			30.62	1,770			40.39	2,357			22
23	(Hydrated lime on corn)	62.28	2,655	11.76	705	35.94	1,800	3.44	—93	47.60	2,614	6.67	177	23
24	(Hydrated lime on wheat)	55.94	2,210			40.94	1,740	6.57	—217	44.69	2,670	*6.57	—217	24
25	None	48.12	1,860			36.25	2 140			41.99	2,594			25
26	Acid phos., 100 lb. (untreated manure on corn and wheat)	63.75	2,560	20.16	—95	36.25	1,690	10.00	580	46.99	2,565	8.92	101	26
27	Acid phosphate, 100 lb	61.40	2,585	17.82	—70	32.19	970	5.94	—140	44.42	2,535	7.35	71	27
28	None	43.59	2,655			26.25	1,110			37.07	2,464			28
29	Commercial 2-8-2, 200 lb	65.31	2,410	21.72	—245	32.19	1,670	5.94	560	45.10	2,710	8.03	246	29
	Average yield of checks 1, 7, 10, 13	53.93	2,394			33.37	1,302			43.06	2,622			
	Average yield of checks 16, 19, 22, 25	51.48	2,077			33.98	1,875			42.36	2,594			

*1 year only.

TABLE 87.—Fertilizers, lime and manure on WHEAT in rotation with corn, oats and clover, Trumbull County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre on wheat (See basal treatment, Table 84)	1918—Block D				1919—Block C				5-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	17.33	2,060	.....	.....	26.67	2,800	.....	.....	24.58	2,487	.....	.....	1
2	Acid phosphate, 200 lb	35.25	2,835	17.75	835	35.73	3,850	8.61	1,017	36.94	3,196	11.82	645	2
3	Acid phosphate, 200 lb.; muriate potash, 15 lb	37.67	2,990	20.01	1,050	34.50	3,230	6.72	363	38.04	3,367	12.39	777	3
4	None	17.83	1,880	.....	.....	28.33	2,900	.....	.....	26.18	2,679	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 15 lb.; nitrate soda, 44 lb.	40.42	3,375	22.39	1,490	35.67	3,760	7.67	807	28.23	3,594	12.58	1,022	5
6	Commercial 2-8-2, 400 lb	41.50	3,360	23.28	1,470	38.33	3,900	10.67	893	35.10	3,256	9.99	792	6
7	None	18.42	1,895	.....	.....	27.33	3,060	.....	.....	24.58	2,358	.....	.....	7
8	Acid phos., 375 lb.; mur. potash, 80 lb.; nit soda, 260 lb.	47.25	4,065	29.28	2,193	37.17	4,570	9.67	1,620	41.08	4,060	16.28	1,739	8
9	Stall manure, phosphated, 4 tons	36.67	3,100	19.14	1,252	34.67	3,520	7.01	680	35.38	3,302	10.36	1,017	9
10	None	17.08	1,825	.....	.....	27.83	2,730	.....	.....	25.23	2,249	.....	.....	10
11	Acid phos., 100 lb.; steamed bonemeal, 200 lb.; mur. potash, 40 lb.; nitrate soda, 60 lb.	39.17	3,000	22.56	1,180	39.33	4,040	12.44	1,353	34.73	3,116	10.75	851	11
12	Stall manure phosphated*	33.50	2,940	17.36	1,125	38.00	3,820	12.06	1,177	33.71	3,127	10.98	845	12
13	None	15.67	1,810	.....	.....	25.00	2,600	.....	.....	21.48	2,299	.....	.....	13
14	Stall manure, untreated, 4 tons	25.75	2,955	10.08	1,145	31.00	3,040	6.00	440	27.44	3,206	5.96	917	14
15	(Fine limestone, 1 ton, on corn and wheat)	34.67	3,170	10.25	985	36.83	3,690	7.00	480	32.23	3,179	5.33	680	15
16	None	24.42	2,185	.....	.....	29.83	3,210	.....	.....	26.90	2,499	.....	.....	16
17	Fine limestone, 1 ton, on wheat	31.33	2,720	5.72	307	31.83	3,640	1.44	430	29.04	2,745	1.32	104	17
18	(Coarse limestone, 4 tons, on corn, alternate rotations)	33.67	3,180	6.86	538	28.83	2,720	—2.11	—490	30.15	2,941	1.50	60	18
19	None	28.00	2,870	.....	.....	31.50	3,210	.....	.....	29.35	2,920	.....	.....	19
20	(Caustic lime, 1 ton, on corn)	35.58	3,165	7.86	362	38.17	4,210	8.06	1,117	13.19	3,134	7.53	699	20
21	Caustic lime, 1 ton, on wheat	39.67	3,670	12.22	933	34.83	3,810	6.11	833	32.25	3,240	5.16	594	21
22	None	27.10	2,670	.....	.....	27.33	2,860	.....	.....	25.96	2,505	.....	.....	22
23	(Hydrated lime, 1 ton, on corn)	37.17	3,370	10.08	912	34.00	3,460	5.89	480	32.33	2,947	8.41	678	23
24	Hydrated lime, 1 ton, on wheat	36.17	3,030	9.17	783	37.00	3,980	8.11	880	31.33	2,882	4.33	505	24
25	None	26.92	2,035	.....	.....	29.67	3,220	.....	.....	29.81	2,799	.....	.....	25
26	Acid phosphate, 200 lb.; untreated manure, 4 tons	28.44	2,419	19.90	1,119	30.17	3,190	13.67	1,430	29.86	2,740	14.56	1,280	26
27	Acid phosphate, 200 lb	14.58	2,750	6.04	1,450	24.67	2,320	8.17	560	24.50	2,474	9.20	1,014	27
28	None	8.54	1,300	.....	.....	16.50	1,760	.....	.....	15.30	1,460	.....	.....	28
29	Commercial 2-8-2, 400 lb	22.92	2,062	14.38	762	27.33	2,810	10.83	1,050	30.58	2,737	15.28	1,277	29
	Average of checks 1, 4, 7, 10, 13	17.27	1,894	.....	.....	27.03	2,818	.....	.....	24.41	2,414	.....	.....	
	Average of checks 16, 19, 22, 25	26.63	2,440	.....	.....	29.58	3,125	.....	.....	28.00	2,682	.....	.....	

*All phosphated manure has 60 pounds acid phosphate to the ton of manure.

TABLE 88.—Residual effect on CLOVER, and financial outcome of fertilizers, lime and manure applied to rotation of corn, oats, wheat and clover, Trumbull County Experiment Farm

Plot	Total treatment per acre for one rotation (Basal treatment, Table 84)	Clover						Financial outcome per rotation			Plot
		1918—Block A		1919—Block D		3-year average		Total value of increase	Total cost of treatment	Net gain	
		Yield	Increase	Yield	Increase	Yield	Increase				
		Lb.	*Lb*	*Lb*	*Lb.*	*Lb.*	*Lb.*	*Dollars*	*Dollars*	*Dollars*	
1	None	3,467		3 244		3 144					1
2	Acid phosphate, 500 lb	6,622	3,244	3,244	118	4 234	1,148	44.1½	7.50	36.60	2
3	Acid phos., 500 lb; muriate potash, 40 lb	3 956	667	2,889	—118	3,351	324	40.77	10.50	30.27	3
4	None	3,200		2,889		2 969					4
5	Acid phos., 500 lb.; mur. potash, 40 lb.; nitrate soda, 110 lb	3,778	785	3,289	267	3,485	526	43.71	16.00	27.71	5
6	Commercial 2-8-2, 1,000 lb	3,778	993	3,289	133	3,479	529	36.41	24.00	12.41	6
7	None	2,578		3,289		2,939					7
8	Acid phos., 750 lb.; mur. potash, 160 lb.; nitrate soda, 520 lb	4 533	1 807	4,178	1,126	4,071	1,209	57.58	49.25	8.33	8
9	Stall manure, phosphated, 8 tons	3,556	682	3,200	385	3,331	546	41.95	19.20	22.75	9
10	None	3,022		2,578		2,708					10
11	Stall manure, phosphated, 8 tons: acid phos 100 lb.; steamed bonemeal, 200 lb.; mur. potash, 40 lb.; nitrate soda, 60 lb.	3,244	459	3,733	1,111	3,265	636	51.35	31.80	19.55	11
12	Stall manure, phosphated, 8 tons; muriate potash, 40 lb	3,911	1,363	3,067	400	3,476	926	48.65	22.20	26.45	12
13	None	2,311		2,711		2,471					13
14	Stall manure, untreated, 8 tons	2,933	622	3,111	400	2,892	421	18.99	12.00	6.99	14
15	Fine limestone, 1 ton each on corn and wheat	2,667	356	3,111	1,289	2,939	685	23.90	12.00	11.90	15
16	None	2,311		1 822		2,255					16
17	Fine limestone, 2 tons on wheat	2,933	548	2 889	756	2,862	441	*9.67	12.00	—2.33	17
18	Coarse limestone, 4 tons on corn, alternate rotations	2,533	74	3,333	888	3,025	481	8.77	12.00	—3.23	18
19	None	2,533		2,756		2,753					19
20	Caustic lime, 1 ton on corn	2,444	237	3,111	429	2,803	333	26.74	12 00	14.74	20
21	Caustic lime, 1 ton on wheat	2,533	651	3,778	1,171	3,342	854	*24.89	12.00	12.89	21
22	None	1,556		2,533		2,356					22
23	Hydrated lime, 1 ton on corn	2,144	514	3,111	682	2,729	598	36.42	12.00	24.42	23
24	Hydrated lime, 1 ton on wheat	1,511	—193	3,689	1,363	2,883	397	*20.38	12.00	8.38	24
25	None	1,778		2,222		2,551					25
26	Acid phos., 500 lb.; untreated manure, 8 tons	1,422	844	1,926	642	2,026	801	57.85	19.50		26
27	Acid phosphate, 500 lb.	2,444	1,866	1,481	197	1,945	720	42.30	7.50	34.80	27
28	None	578		1,284		1,225					28
29	Commercial 2-8-2, 1,000 lb	2,844	2,266	1,382	98	2,241	1,016	59.50	24.00	35.50	29
	Average of checks 1, 4, 7, 10, 13	2,916		2,942		2,846					
	Average of checks 16, 19, 22, 25	1,626		2,333		2,339					

*Plots 17, 21 and 24 average increase for corn 2 years, for oats 1 year.

COMPARISON OF VARIETIES AND CULTURAL WORK

DEPARTMENT OF AGRONOMY

CORN

The season for corn is quite short in this county and only the well-acclimated local varieties have given satisfaction year after year. In the 4-year average yield, Van Wye's Yellow is first in yield, as well as in quality; Clarage, second, York's Yellow Dent, third, Ohio 84, fourth.

TABLE 89.—Comparison of varieties of CORN, Trumbull County Experiment Farm

	Yield per acre					Average	
	1915	1916†	1917	1918	1919	Grain	Stover
						Bu.	*Lb.*
Swisher's White	30.02	.....	.....	.....	.....	.....	2,561
Yellow Dent (Local)	22.75	.....	.....	.....	.....	.....	1,894
Leaming (Frost)	40.63	.....	93.44	34.28	77.46	61.45	4,045
Leaming (Wooster)	46.68	.....	.....	.....	.....	.....	3,465
Ohio 84	44.97	.....	94.59	34.40	75.57	62.38	3,347
Medina Pride	45.88	.....	90.01	35.23	77.47	62.15	3,491
White Cap	40.39	.....	83.88	29.87	69.71	55.96	3,665
Darke Co. Mammoth	34.33	.....	.....	.....	.....	.....	4,950
Flint	42.05	.....	53.34	26.52	66.61	47.13	2,788
Clarage	.....	.....	89.56	32.73	76.66	66.32	3,455
Van Wye's Yellow	.....	.....	95.37	32.15	72.34	66.62	2,627
Norton's Dent	.....	.....	70.40	.....	.....	.....	3,600
York's Yellow Dent	.....	.....	87.44	33.02	71.00	63.82	3,158
Golden Glow	.....	.....	81.47	29.76	72.33	61.19	2,907
Minnesota No. 13	.....	.....	81.86	28.85	60.13	56.95	3,357
Ohio 74	.....	.....	73.14	30.85	.....	.....	3,170
Pride of the North	.....	.....	77.04	30.90	65.19	57.71	3,298
Stone's Calico	.....	.....	70.84	24.14	63.80	52.93	2,198
Silver King	.....	.....	77.34	26.68	65.66	56.56	2,777
Leetonia Pride	.....	.....	*50.67	.....	.....	.....	3,229
Improved Sabin	.....	.....	*63.36	.....	.....	.....	3,409
Gustavus Yellow Dent	.....	.....	.....	24.30	.....	.....	1,300
Cover's Yellow Dent	.....	.....	.....	26.09	.....	.....	1,650
Vandervort's	.....	.....	.....	27.37	.....	.....	1,150
Cole's Yellow Dent	.....	.....	.....	25.26	.....	.....	900
Scott's Yellow Dent	.....	.....	.....	30.42	.....	.....	900
Salem Weiss	.....	.....	.....	21.09	.....	.....	900
Mott's Yellow Dent	.....	.....	.....	23.85	66.95	.....	1,750
Early Yellow Dent	.....	.....	.....	34.43	.....	.....	2,100
Early Leaming	.....	.....	.....	23.85	.....	.....	1,700
Stauffer's Yellow	.....	.....	.....	.....	70.56	.....	3,050
Van Wye's Farm Selected	.....	.....	.....	.....	62.89	.....	1,950

*Not as good stand as others.
†Frosted; put in silo.

Several different varieties of corn have been tested for silage, including Ohio dent varieties and large southern varieties. Seven varieties have been tested for four seasons. Averaging the 4 years, the Eureka leads slightly, with Old Virginia, second, Blue Ridge, third, Darke County Mammoth, fourth. It may well be questioned whether the yield of the large southern varieties is enough larger to offset their smaller proportion of grain.

TABLE 90.—Comparison of varieties of SILAGE CORN, Trumbull County Experiment Farm

	Yield per acre—Tons					Average
	1915	1916	1917	1918	1919	
Clarage	6.04	8.29	.....	7.25	12.20	8.44
Leaming (Frost)	6.80	9.51	.....	9.45	12.04	9.45
Darke Co. Mammoth	7.87	10.07	.....	9.85	13.22	10.25
Ried's Yellow Dent	7.49	9.69	.....	8.65	11.37	9.30
Old Virginia	8.95	11.82	10.15	8.70	17.17	11.36
Eureka	10.37	11.29	.....	8.80	17.08	11.88
Blue Ridge	8.80	11.12	10.70	8.30	14.67	10.72
Leaming P. D.	.....	.....	88.03	9.90	10.52	9.48
Red Cab Ensilage	.....	.....	7.53	.....	.....	.....
Boone Co. White	.....	.....	.....	9.71	15.29	.....
Va. Horse Tooth	.....	.....	.....	4.15	4.25	.....
Auber Cane	.....	.....	.....	3.15	5.85	.....
Johnson Co. White	.....	.....	.....	.....	12.49	.....
Blue Mt.	.....	.....	.....	.....	13.94	.....

OATS AND SPRING CEREALS

This test includes 14 varieties of oats all but one of which have been tested 5 years, and one variety each of spring barley, emmer and spring wheat. The Silvermine stands highest in yield, Golden Rain, second, Big Four, third, and Ohio 6203, fourth. Oats and emmer are figured at 32 pounds per bushel, barley at 48 pounds and spring wheat at 60 pounds. Emmer is apparently the least productive of the spring cereals, and barley is inferior to oats for this section. Spring wheat has given some good yields, but seems somewhat uncertain.

TABLE 91.—Comparison of varieties of OATS and SPRING WHEAT, Trumbull County Experiment Farm

	Yield per acre - bushels					Average	
	1915	1916	1917	1918	1919	Grain	Straw
						Bu.	*Lb.*
Ohio 7009	38.95	28.37	60.21	70.84	33.56	46.39	1,354
Burt	48.01	28.85	69.90	74.80	36.90	51.69	1,892
Ohio 6203	43.27	35.03	70.94	81.21	34.50	52.99	2,419
Ohio 201	46.19	33.37	62.19	73.87	34.72	50.07	2,792
Big Four	43.48	31.66	66.56	85.03	40.96	53.14	2,433
Ohio 6222	40.04	28.99	68.55	75.06	36.06	49.74	2,625
Silver Mine	46.87	33.38	72.76	84.33	37.32	54.93	2,441
Swedish Select	44.48	26.92	66.93	81.78	30.75	50.17	2,281
Storm King	43.53	30.62	66.46	61.28	35.97	47.56	2,589
Joanette	47.02	32.12	74.69	70.32	38.15	52.46	2,512
Golden Rain	43.89	32.90	71.62	83.30	35.76	53.49	2,538
White Russian	36.29	27.44	69.59	78.71	28.04	48.01	2,313
Wideawake	44.73	31.50	63.02	72.51	32.11	48.77	2,575
Corn Belt	.....	32.80	67.92	70.22	36.28	51.80	2,636
Oderbrucker Barley	10.42*	13.33	36.68	35.21	19.17	23.00	2,264
Emmer	22.12*	15.78	39.06	34.22	22.50	26.74	2,336
Spring Wheat Blue Ribbon	.....	5.67	31.08	23.94	10.07	17.69	2,213
Spring wheat Marquis	.....	.....	.....	7.83	14.00	.....	1,645
Spring Wheat Groff	7.50*	.....	.....	.....	.....	.....	1,850

*Very dirty 1915.

Date of seeding oats and spring wheat.—Several tests have been made in seeding oats and spring wheat at different dates. The yield of oats as a rule was largest and the quality highest with the early seeding. In 1918, spring wheat seeded March 30 gave a yield of 28.83 bushels per acre; seeded April 20, 17.17 bushels and seeded May 11, 7.83 bushels. In 1919, the seeding of April 7 yielded 13.33 bushels per acre and that of May 3, 7. bushels.

WINTER WHEAT

Thirteen varieties of wheat have been included in the full 4-years' test, of which the Gladden is first in yield, Valley, second, Ohio 9920, third, and Fultz, fourth.

TABLE 92.—Comparison of varieties of WHEAT, Trumbull County Experiment Farm

Variety	Yield per acre				Average	
	1916	1917	1918	1919	Grain	Straw
					Bu.	*Lb.*
Velvet Chaff	19.78	42.95	23.01	36.17	30.48	3,005
Fultz	22.39	44.81	31.50	39.73	34.61	2,841
Trumbull	22.00	43.18	29.51	38.61	33.32	2,865
Poole	20.42	45.29	27.73	34.56	32.00	2,934
Ohio 9920	22.22	48.53	28.18	40.89	34.95	2,801
Portage	21.41	44.87	24.01	39.11	32.36	2,685
Harvest King	21.49	.....	.....	.....	.....	2,250
Red Wave	17.97	46.89	28.68	40.62	33.54	3,034
Fultz's Mediterranean	19.50	47.58	24.18	37.72	32.24	2,774
Dawson's Golden Chaff	17.67	50.65	27.13	41.89	34.33	3,167
American Bronze	19.63	46.26	29.82	38.79	33.62	3,416
Nigger	22.39	40.42	25.79	.....	29.53	2,315
Gladden	26 43	47.31	32.40	43.94	37.52	3,434
Mediterranean	20.03	.....	27.79	32.00	26.61	2,428
Goens	18.36	40.29	19.98	40.00	29.66	2,370
Turkey Red	8.62	.....	.....	.....	.....	1,480
Valley	25.62	48.53	35.43	35.43	36.25	3,202
Ohio 127	.....	46.04	30.29	39.95	38.76	3,178
Red Wonder	.....	43.37	28.35	26.33	32.68	2,622
Ohio 13384	.....	.....	.....	41.00	.....	.....

For three seasons a date of seeding test has been conducted with the result that wheat seeded September 22 and 23 has given the highest yield, September 1 and 2, second, and September 8 and 9, third.

TABLE 93.—Date of seeding wheat, Trumbull County Experiment Farm

	Yield per acre—Bushels			Average	
	1916	1917	1919	Grain	Straw
				Bu.	*Lb.*
September 1 and 3	22.00	50.00	34.67	35.56	3,576
September 8 and 9	19.87	48.67	36.05	34.86	3,584
September 15 and 18	20.33	45.47	36.33	34.04	3,467
September 22 and 23	23.33	47.67	38.67	36.56	3,727
October 1 and 2	15.17	37.50	36.33	29.66	2,995
October 10	4.17	18.67	32.00	18.28	1,788
October 21	.....	8.50	.....	.....	.....

SOYBEANS

Nine varieties of soybeans have been tested, but only five of them for the full period of 4 years. The Ebony is first in yield, Ohio 9100, second, and the Elton, third. In 1919 the crop did not mature and was plowed under.

TABLE 94.—Comparison of varieties of SOYBEANS, Trumbull County Experiment Farm

Variety	Yield per acre—Bushels				Average	
	1915	1916	1917	1918	Grain	Straw
Elton	18.09	6.09	18.45	10.63	13.31	1,609
Ebony	23.45	10.10	20.45	8.82	15.70	1,805
Ohio 9100	16.95	7.43	24.86	10.70	14.98	1,653
Ohio 9016	11.31	3.44	14.75	9.99	9.87	1,644
Ohio 7496	16.38	4.57	.....	.....	.....	.....
Medium Green	13.56	7.76	20.50	9.68	12.87	1,909
Manchuria	.....	8.49	21.67	9.01	13.06	1,201
Mongol	.....	5.92	25.94	8.04	13.30	1,802
17268 Ito San	.....	.....	29.48	7.68	.....	.....

BULLETIN
OF THE
Ohio Agricultural Experiment Station
NUMBER 344 JUNE, 1920

COUNTY EXPERIMENT FARMS IN OHIO

PART VII

THE MAHONING COUNTY EXPERIMENT FARM

FOURTH AND FIFTH ANNUAL REPORTS FOR 1918 AND 1919

CHARLES E. THORNE, DIRECTOR

CARY W. MONTGOMERY, CHIEF

M. O. BUGBY AND J. P. MARKLEY, SUPERINTENDENTS
C. M. RUNKLE, L. J. DEMING AND McKINLEY NEWTON, FOREMEN

PERSONNEL

M. O. Bugby resigned as superintendent of the farm on October 19, 1918, and was succeeded by J. P. Markley. After the death of Mr. Runkle in June, 1918, L. J. Deming acted as foreman until November 1, 1918, and was succeeded by McKinley Newton, March 10, 1919.

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment, March 1, 1920

Original cost: land and buildings		$28,000.00
Permanent improvements to March, 1918*		7,376.58
Permanent improvements made in 1918		461.62
Permanent improvements made in 1919		481.32
		$36,319.52
Operating equipment:		
Livestock: 5 horses, $740; cattle, $2,525	$3,265.00	
Machinery, tools and harness	3,356.00	
Crops, feeds and seeds: corn, $640; oats, $297; potatoes, $225; silage, $675; hay, $462; straw, $350; meal, $33.62; timothy seed, $4	2,686.62	
Fertilizer and lime	297.50	
Drain tile	17.50	
Fence posts	66.00	
Containers	134.50	
Plot fixtures	161.00	
Bedroom equipment	35.00	
Office equipment	59.00	
Sundries: oil	9.00	
Total equipment		10,087.12
Total investment		$46,406.64

*Reported in Bulletin 323.

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1919

Dr.

To Receipts

From Farm Sales:		
Livestock: cattle	$1,009.20	
Crops: wheat, $759.05; rye, $3; hay, $151.72; sweet corn, $235.31; cucumbers, $56.75; cabbage, $275.66; tomatoes, $285.79; strawberries, $1,125.78; apples, $407.03; potatoes, $697.95; soybeans, $20.08; celery, $126.85	4,144.97	
Pasture rent	246.00	
Sundries: seeds, $382.32; spray material, $1; containers, $1.45; use of implements, $1.88; fence, $67.20; special, $1; labor, $4.25; screenings, $1.28	460.38	
From County Maintenance Fund	2,191.04	
Total receipts		8,051.59
To balance forward March 1, 1918		1,633.15
		$9,684.74

Cr.

By Expenditures

For Labor	$3,241.88	
For Current Expenses:		
Seeds, $179.13; fertilizer, $412.63; spray material, $53.50; containers, $89.82; binding material, $59.61; plot fixtures, $65; feeds, $101.28; livestock equipment, $30.85; horse shoeing, $27.30; veterinary, $21.30; livestock incidentals, $2.50; building renewal and repair, $75.62; implement maintenance, $61.65; engine maintenance, $124.76; water supply maintenance, $10.77; office supplies, $4.50; transportation, $112.63; communication, $96; publicity, $26.30; fuel and light, $69.66; motor maintenance, $279.98; miscellaneous hardware, $8.83; bedroom equipment, $58.88	1,972.50	
For Permanent Improvements:		
Building, $117.71; concrete and masonry, $29.40; fence, $144; drainage, $58.90	350.01	
For Machinery, tools and harness	233.39	
For Livestock: horses, $25; cattle, $665	690.00	
Total expenditures		6,487.78
By balance forward February 28, 1919		3,196.96
		$9,684.74

RECEIPTS AND EXPENDITURES

For the year ending February 29, 1920

Dr.

To Receipts

From Farm Sales:		
Livestock: 2 heifers, $246; veal, $60	$ 306.00	
Crops: corn, $42.01; oats, $161.75; wheat, $1,851.57; cabbage, $313.06; cucumbers, $64.40; turnips, 90 cents; potatoes, $715.85; fodder, $4.65; sweet corn, $132.42; pears, $17.75; strawberries, $800.81; grapes, $35.60; peaches, 40 cents; apples, $248.20; tomatoes, $351..	4,740.37	
Sundries: implement use, $4.50; strawberry plants, $8.50; house rent, $80; timber, $331.05	424.05	
From County	2,076.48	
Total receipts		$7,546.90
To balance forward March 1, 1919		3,196.96
		$10,743.86

Cr.

By Expenditures

For Labor	$3,395.46	
For Current Expenses:		
Seeds, $157.11; fertilizer, $410.97; spray material, $18.22; containers, $174.73; binding material, $59.34; machine hire, $54.59; feeds, $23.20; livestock equipment, $25.08; horse shoeing, $37.85; veterinary, $7.92; livestock fees, 50 cents; livestock incidentals, $8; building renewal and repair, $125.50; water system, $2.61; implement maintenance, $135.58; engine maintenance, $279.80; fence maintenance, $19.20; plot fixtures, $63.80; market stall, $20; transportation, $51.55; communication, $44.05; publicity, $1.55; office supplies, $41.69; fuel and light, $18.36; miscellaneous hardware, $20.49	1,796.89	
For Permanent Improvements:		
Concrete work, $201.09; fence, $65.95; painting, $37.54 general, $6.75	311.33	
For Machinery, tools and harness	1,325.05	
Livestock: cattle and freight on same	1,541.46	
Total expenditures		$8,370.19
By balance forward February 29, 1920		2,373.67
		$10,743.86

CROP AND LABOR STATISTICS, 1918 AND 1919

Farm Acres	1918	1919	Farm Acres	1918	1919
	Acres	*Acres*		*Acres*	*Acres*
Total Farm	275	275	Woodland	24.	24
Farmstead	12.7	12.7	Public roads	10.93	10.93
Cultivated	112.04	112.8	Farm roads	12.29	10.43
Orchard	18.7	18.7	Waste	19.34	20.44
Permanent pasture	65	65			

	Plot work			Field crops		
1918						
	Number of plots	Acres	Yield per acre	Acres	Yield per acre	Total acres
Corn	58	5.8	46.73 bu.	.52		6.40
Corn silage	8	.8	9.29 tons	18.	8.00 tons	18.8
Oats	10	5.6	61.54 bu.	15.75*		21.35
Wheat	66	6.6	22.27 bu.	17.25†	34.77 bu.	23.85
Soybeans (hay)	10	1.0	1.09 tons	2.37*		3.37
Potatoes	10	.5	72.63 bu.	11.18	62.8 bu.	11.68
Sweet corn	32	.8	1.47 tons	.75	225 doz.	1.55
Cabbage	32	.8	5.29 tons			.8
Cucumbers	32	.8	1.00 ton			.8
Tomatoes	32	.8	5.92 tons			.8
Strawberries	20	1.0	6,152 qts.	.18		1.18
Beans				.75‡		.75
Celery				.35	874 bunches	.35
Grapes				.75§		.75
Rye				.75	20 bu.	.75
Hay, mixed	20	2.25	1.75 tons	16.61	1.22 tons	18.86
Total	320	26.83		85.21		112.04

*Not threshed. †14 acres not threshed. ‡Not harvested. §Not bearing.

1919						
Corn	50	5.	64.14 bu.	2.975	93.0 bu.	7.975
Corn silage	12	1.2	10.53 tons	12.0	6.25 tons	13.2
Cane silage	1	.1	5.5 tons			.1
Oats	54	5.4	41.17 bu.	9.066	35.75 bu.	14.4
Wheat	66	6.6	25.32 bu.	17.162	29.8 bu.	23.762
Rye				14.4	4.28 bu.	
Soybeans*	10	1.0				15.0
Potatoes	10	.5	70.15 bu.	5.75	97.4 bu.	6.25
Sweet corn	32	.8	3.1 tons	1.53	374 doz.	2.33
Cabbage	32	.8	3.75 tons	.833	3.07 tons	1.633
Cucumbers	32	.8	2.7 tons	.15	1.75 tons	.95
Tomatoes	32	.8	8.05 tons	.333	3.7 tons	1.133
Strawberries	30	1.5	2.96 bu.			1.5
Grapes				.75	450 lb.	.75
Barley	1	.1	27.7 bu.			.1
Emmer	1	.1	35.0 bu.			.1
Hay (clover)	30	3,375	1.42 tons	17.047	1.82 tons	20.412
Hay (soybean)	1	.1	.9 ton			.1
Hay (oat and pea)	1	.1	22.2 tons			.1
Hay (mixed)				2.934		2.934
	395	28.275		84.530		112.80

*Plowed under. †Estimated.

	1918	1919
Number of work horses used on Mahoning County Experiment Farm	5	5
Number of crop acres per work horse	26.42	23.05
Number of man hours per year (March 1 to February 28, inclusive)	11,945	12,690
Number of horse hours per year (March 1 to February 28, inclusive)	6,673	6,067

FARM WORK AND PERMANENT IMPROVEMENTS FOR 1918 AND 1919

J. P. MARKLEY

CLIMATIC CONDITIONS

In 1918 the climatic conditions were favorable to crop production; there was about an average rainfall, well distributed over the growing season. An early fall frost damaged the corn and potato crops to some extent.

In the spring of 1919 the corn planting and oats seeding were delayed on account of the excessive rainfall. This with dry weather in the early part of the summer caused a light oat crop. The rainfall in late summer and early fall was above normal, a condition favorable to the growing potato and corn crops but not so favorable to threshing and the digging of potatoes.

A heavy frost late in the spring did considerable damage to fruit, especially to the peach crop.

REPORT OF CATTLE FEEDING

Twenty grade Shorthorn steers were purchased on the Chicago market for feeding. Their average weight at Chicago was 724 pounds and when unloaded at Canfield, January 27, 1920, was 678 pounds. Their feed was gradually increased from a few pounds per day, per steer, until at the end of 2 weeks the twenty head were consuming 600 pounds of corn silage, 75 pounds of mixed hay, 40 pounds of corn stover and 40 pounds of linseed oilmeal per day. After feeding 500 pounds of linseed oilmeal a change was made to cottonseed oilmeal. One steer being sick a few days was fed a small amount of bran and oats until it was again on full feed of hay and silage.

SUMMARY OF CATTLE FEEDING

Weight at Chicago, 14,480 lbs. at 10c	$1,448.00	
Commission	12.00	
Feed at yards	6.00	
Freight and war tax	74.71	
Weighing at Canfield	.75	
		$1,541.46
Feed and Labor		
January 27 to 31, inclusive		
Man labor, 19¼ hours at 30c per hour	5.77	
Truck hire, 6 miles at 15c per mile	.90	
Feed consumed	8.40	15.07
Total cost to farm February 1, 1920		$1,556.53

Feed and Labor February 1 to 29, inclusive		
Man labor, 79¾ hours at 30c per hour	23.93	
Horse labor, 7 hours at 15c per hour	1.05	
Truck hire, 10½ miles at 15c per mile	1.57	
Feed consumed	158.13	
Medicine	3.50	188.18
Total cost at farm March 1, 1920		$1,744.71

Price of rough feed: Hay, $20 per ton; silage, $10 per ton and corn stover $4 per ton.

Price of grain: Linseed oilmeal, $4.25 per 100 pounds; cottonseed oilmeal, $4.10 per 100 pounds; bran, $2.65 per 100 pounds, and oats 90 cents per bushel.

Amount of manure produced from January 27 to March 1, about 13 tons.

On March 1, the date of this report, and 5 weeks after the cattle were brought to the farm, they were in good growing condition and making satisfactory gains.

PERMANENT IMPROVEMENTS

The permanent improvements made in 1918 and 1919 were: A heating system in greenhouse; two concrete hotbeds; 105 rods of tile drains; cinder drives about buildings; concrete floor in main part of barn No. 1; ornamental planting about buildings, and pasture field fence, the cost of which was as follows:

1918: Heating system in greenhouse:
Man labor, 151½ hours, $52.75; material, $119.51; total, $172.26.

Hotbeds:
Man labor, 159¾ hours, $51.14; horse labor, 4½ hours, $0.68; material (including sash), $135.53; total, $187.35.

Tile drainage:
Man labor, 153¾ hours, $41.93; horse labor, 54½ hours, $8.18; 1,730 tiles, $51.90; total, $102.01.

Total expenditures, permanent improvements for 1918, $461.62.

1919: Farm roads:
Man labor, 66½ hours, $19.07; horse labor, 99 hours, $14.85; cinders, 27 loads, $6.75; total, $40.67.

Concrete floor in barn No. 1:
Man labor, 201 hours, $80.12; horse labor, 96 hours, $14.40; use of mixer 3 days, $15; 28½ barrels cement, $79.80; 38,460 pounds sand, $34.61; 23,785 pounds slag, $23.78; 10 loads cinders, $2.50; total, $250.21.

Fence around pasture (not complete):
Man labor, 150 hours, $41.25; horse labor, 23 hours, $3.45; 120 rods fence, $61.20; 160 posts, $35.20; total, $141.10.

Ornamental planting:
Trees and shrubs, $37.54; freight on same, $2.45; man labor, 34 hours, $9.35; total, $49.34.

Total expenses, permanent improvements for 1919, $481.32.

NEW EXPERIMENTAL WORK

In the spring of 1919, the following new work was started: Continuous cropping and rotative cropping for production of cow feed; seed selection of corn; hill selection of potatoes and soil improvement test with truck crops.

Plan for continuous cropping and rotative cropping experiment: Rotation I, Plots 1 and 2, in 2-year rotation of corn and oats and Canada peas, and fertilized at the rate of 6 tons of phosphated manure and 1 ton of limestone per acre on corn; Plot 3, corn grown continuously and fertilized at the rate of 3 tons phosphated manure, each year, and 2 tons ground limestone, every 4 years, per acre, with cover crop of rye and vetch.

Rotation II, Plots 4, 5 and 6, in a 3-year rotation of corn, oats and clover and fertilized at the rate of 9 tons of phosphated manure and 1½ tons of limestone per acre each year on corn.

SELECTION OF SEED CORN

About 1 acre was planted to Clarage corn. The seed for the planting of this field was procured from the central part of the State and requires a longer growing period to mature than we have in this section in the average year; for this reason early maturing ears were selected for seed to plant the 1920 crop.

HILL SELECTION OF POTATOES

For the hill selection of potatoes, Carman No. 3 was the variety used. About 1½ acres were planted in 1919 and enough seed was selected from vines having the desired qualities to plant 1 acre in 1920.

SOIL IMPROVEMENT TEST

The object of this test is to see if manure can be dispensed with in the growing of truck crops and the organic matter of the soil maintained by devoting 1 year to the growing of an improvement crop. The crops grown are sweet corn, cabbage, tomatoes and improvement crop for 1 year and the treatment is 600 pounds of acid phosphate, 200 pounds of nitrate of soda and 100 pounds of muriate of potash per acre on all crops, except the soil improvement crop, and 2 tons of ground limestone per acre once in the rotation. After each truck crop is harvested the block is sown to rye for a cover crop, and following the tomato crop clover is sown in the rye for an improvement crop.

MARKETING OF TRUCK CROPS

The truck crops from the experiment farm are marketed in Youngstown. A study of markets will show that market demands differ in different cities. It is not always the heaviest yielding variety that gives the largest returns. For example, it is found that the larger-growing varieties of cabbage are not in demand on the Youngstown market as are the smaller-headed varieties.

DISTRIBUTION OF LABOR

Another item to be considered in the growing of truck crops, and especially at this time, is the distribution of labor. Although larger returns may be expected from an acre of tomatoes than from an acre of sweet corn, more labor is required to grow the tomatoes, and it would not be practical to devote our entire acreage of truck land to the growing of this crop, as it would probably be impossible to get the temporary help necessary to harvest the crop. A good crop rotation not only aids in keeping up the fertility of the soil and preventing plant diseases but also gives a better distribution of labor.

VINEYARD

In the spring of 1916 a small vineyard was planted. It has been kept cultivated and in 1919 a cover crop of oats and Canada peas was sown early in August. There are nine rows 8 feet apart and with 41 vines, 10 feet apart, in each row. The rows run north and south and are lettered, beginning with the east row. A few grapes were harvested in 1919. The varieties are in the order named, the first named being on the south end of the row.

Key to Variety Grapes

Row A
20 Campbell's Early
10 Empire State
9 Diamond
2 Herbert

Row B
21 Worden
19 Concord
1 Herbert

Row C
5 Wyoming Red
10 Green's Early
5 Moore's Early
10 Wilder
10 Green Mountain
1 Herbert

Row D
5 Barry
5 Ulster's Prolific
5 Jefferson
5 Lindley
10 Cottage
10 Delaware
1 Herbert

Row E
5 Barry
10 Moyer
20 Brighton
5 Brilliant
1 Herbert

Fow F
10 Agawam
10 Salem
10 Pocklington
5 R. W. Munson
5 Brilliant
1 Herbert

Row G
10 Jessica
10 Woodruff Red
20 Niagara
1 Herbert

Row H
10 Regal
10 Daisy
10 King
10 Lucile
1 Herbert

Row I
10 Captivator
5 Headlight
5 Captain
10 Gold Coin
10 Wapanuka
1 Herbert

STRAWBERRIES

A fertility experiment with strawberries grown in rotation with potatoes was begun in 1916. There are three half-acre blocks devoted to this experiment and the rotation is 1, strawberries, 2, strawberries, and 3, potatoes. As soon as the second crop of strawberries is harvested the land is plowed and planted to potatoes and

the following year is again planted to strawberries. The varieties grown are Parson's Beauty and Sample. As a result of the dry weather in June, the 1919 yield was not so large as that of 1918. The crops for these 2 years were marketed either at the farm or at Canfield, as the Youngstown price would not justify the extra cost of marketing at that place.

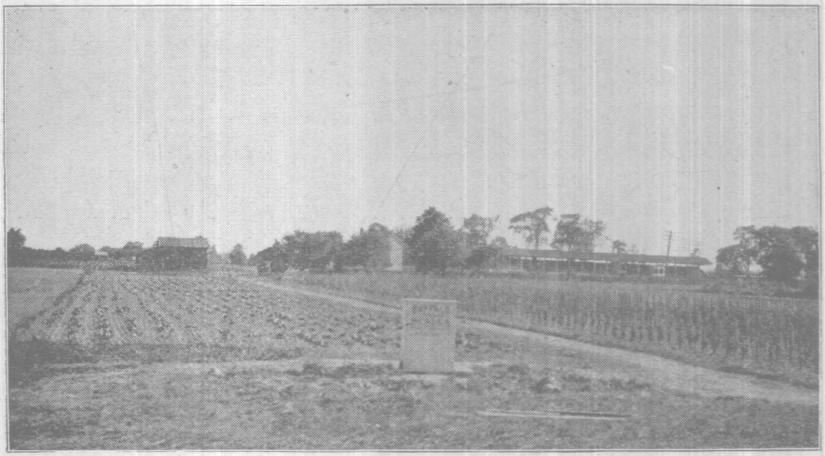
The cost of marketing the crops for the 2 years was as follows:

Labor and miscellaneous cost of marketing strawberries in 1918:		
6,000 quart measures at $4.40 per M	$ 26.40	
100 crates, 32 qt. each, at 17½c each	17.50	
10 dozen division racks at 30c per dozen	3.00	
10 pounds nails for crates at 8c per pound	.80	
Less 4 percent	1.90	
	47.70	
	$ 45.80	
Nailing berry crates, 11½ hours	2.63	
Picking, sorting and marketing, 199½ hours	49.80	
Picking 5,280 quarts	157.14	
Truck, 5½ hours	11.00	
	$ 266.37	
Sold 213 bushels		$1,118.65
Net profit	852.28	
	$1,118.65	$1,118.65
Cost of marketing strawberries in 1919:		
5,750 quart measures at $6.40 per M	$ 36.80	
60 crates at 22c each	13.20	
10 pounds nails for crates at 12c per pound	1.20	
Nailing berry crates, 18½ hours	5.00	
Picking, sorting and marketing, 94 hours	25.38	
Picking	175.11	
Truck miles marketing, 39 at 10c	3.90	
	$260.59	
Sold 175 bushels		$800.81
Net profit	540.22	
	$800.81	$800.81

FIELD WORK

The 75 acres of tillable land lying south and west of the buildings was divided into five fields and the following 5-year crop rotation adopted: corn, rye and potatoes, oats, wheat, clover. All corn ground to be sown to rye, part of which is to be plowed under for potatoes and the rye harvested from the remainder of the field; clover to be sown in the rye for a plow-down crop for oats. This seeding is at the rate of 2 pounds each of alfalfa, red, mammoth, alsike and sweet clover. The grass seed mixture and rate of seeding in the wheat is 5 pounds of red clover, 3 pounds of alsike, 2 pounds of alfalfa and 4 pounds of timothy.

The plan of fertilizing the field crops in this rotation is as follows: For corn, 5 tons phosphated manure; for potatoes, 300 pounds of acid phosphate and 50 pounds of muriate of potash; for oats, 100 pounds of acid phosphate; for wheat, 200 pounds of acid phosphate, 4 tons of phosphated manure as a top dressing and 2 tons of ground limestone.



Truck plots, Mahoning County Experiment Farm; fair grounds in the background

ALFALFA

Two small fields of about one-half acre each were seeded to alfalfa in 1919, one July 11 and the other August 8. The fields were plowed early in the season and worked at intervals to kill weeds and to conserve the moisture, and at seeding time there was a fine, firm seed bed. Both fields were dressed with 8 tons of manure, 500 pounds of acid phosphate and 3 tons of ground limestone per acre, and were seeded at the rate of 15 pounds of common alfalfa seed per acre. There is a fine stand of alfalfa on the field seeded July 11, and it made a heavy growth before winter, but on the field seeded August 8, although there was plenty of moisture after seeding, there is very little alfalfa.

FORESTRY WORK

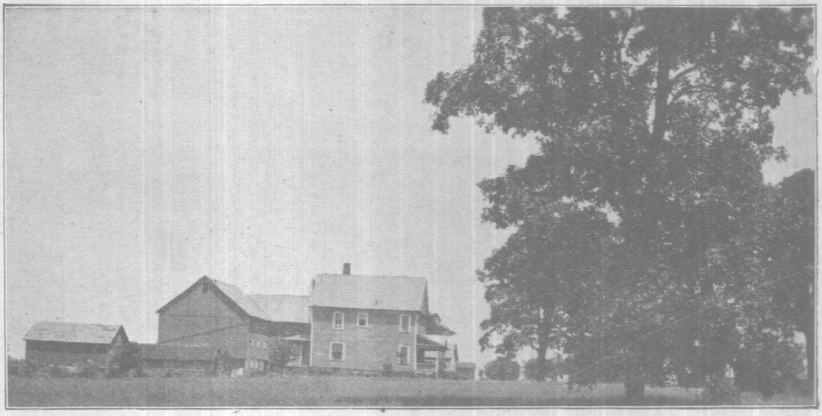
In the spring of 1918, about 1 acre of land, in a corner of the woodlot where there were no large trees, was plowed, fitted and planted to Douglas fir, cypress, hemlock, red pine, Austrian pine, Scotch pine, ponderosa and Japanese pine. One thousand seven hundred and twelve trees were planted on this plot and about 1,500

trees, mostly Norway poplar and white ash, were planted in open spaces in other parts of the woodlot. On June 4, 1919, there was a wind storm that did a large amount of damage to woodlots throughout this section. More than a hundred large trees were uprooted in the experiment farm woodlot.

EQUIPMENT

In 1918 and 1919 the following was added to the farm equipment: a 4-wheeled trailer, for use in marketing truck crops; bobsleds; hay tedder; sulky plow; spray gun, and potato-spraying attachment, and the greenhouse was completed and equipped with a heating system. A Ford truck was purchased in the summer of 1919, the light-delivery truck used by the farm previous to this time being given as part payment.

An 8-16 Mogul tractor that had been in use on the farm for the past four seasons was accepted as part payment on a Titan 10-20 tractor, purchased in the fall of 1919.



Farmstead, Mahoning County Experiment Farm

MEETINGS

The annual field meetings held late in June have been well attended, there being several hundred people present at each meeting, from Mahoning and neighboring counties. The forenoon was given to an inspection of the farm and a program was arranged for the afternoon. The afternoon meeting was held in the grandstand at the county fair grounds which are located across the road from the farm.

Invitations to hold picnics at the Experiment Farm in the month of August were sent to the granges of the county. Three

granges responded to the invitation and the meetings were well attended. A part of the afternoon was devoted to an inspection of the experimental work and the remainder to playing games and visiting.

The success of these meetings has been due partly to the cordial cooperation of the county agent.

EXHIBITS

Arrangements were made with the fair board for space for an experiment farm exhibit at the county fair. In this exhibit there were shown several of the better varieties of field and silage corn; varieties of wheat, oats and soybeans, both threshed and in the sheaf; varieties of apples and some of the products of the truck fields. The results of this work were satisfactory, as considerable interest was manifested in the exhibit.

THE MAINTENANCE OF SOIL FERTILITY

DEPARTMENT OF SOILS

I. EXPERIMENTS WITH FIELD CROPS

Three rotations are in progress on the Mahoning County Experiment Farm, namely:

Rotation I: Corn, oats, wheat and mammoth clover, the clover to be plowed under after saving the seed.

Rotation II: Corn, oats, wheat and medium clover, all crops to be removed.

Rotation III: Corn, soybeans, wheat and clover, all crops to be removed.

All the land in these rotations is dressed with finely-ground limestone after being plowed for corn, the limestone being applied over all the land, fertilized and unfertilized alike.

The arrangement of the land is shown in the diagram accompanying. Each rotation occupies 4 blocks of 10 plots each. The plots contain one-tenth acre each and are separated by paths 2 feet wide. The field slopes gently to the west and tile drains are laid under alternate paths. Corn was planted on Blocks C, D, G, H, L and M in 1916 and 1917, but it was injured by an early frost in 1916 and by wireworms in 1917 and the plots were not harvested separately.

The subsequent cropping has been as follows:

Cropping at Mahoning County Experiment Farm

Rotation	Year	Block A	Block B	Block C	Block D
I	1916 1917 1918 1919	.... Corn Oats	Oats[1] Wheat Clover Corn	Corn[2] Oats Wheat Clover	..... Corn[3] Oats Wheat
		E	F	G	H
II	1916 1917 1918 1919	.... Corn Oats	Oats[1] Wheat Clover Corn	Corn[2] Oats Wheat Clover	..... Corn[3] Oats Wheat
		I	K	L	M
III	1916 1917 1918 1919	.... Corn Soybeans	Soybeans[4] Wheat Clover Corn	Corn[2] ..... Wheat Clover	..... Corn[3] Soybeans Wheat

[1]Oats sown late and cut for hay.
[2]Corn frosted
[3]Corn taken by wireworms and soybeans grown instead.
[4]Crop not harvested separately.

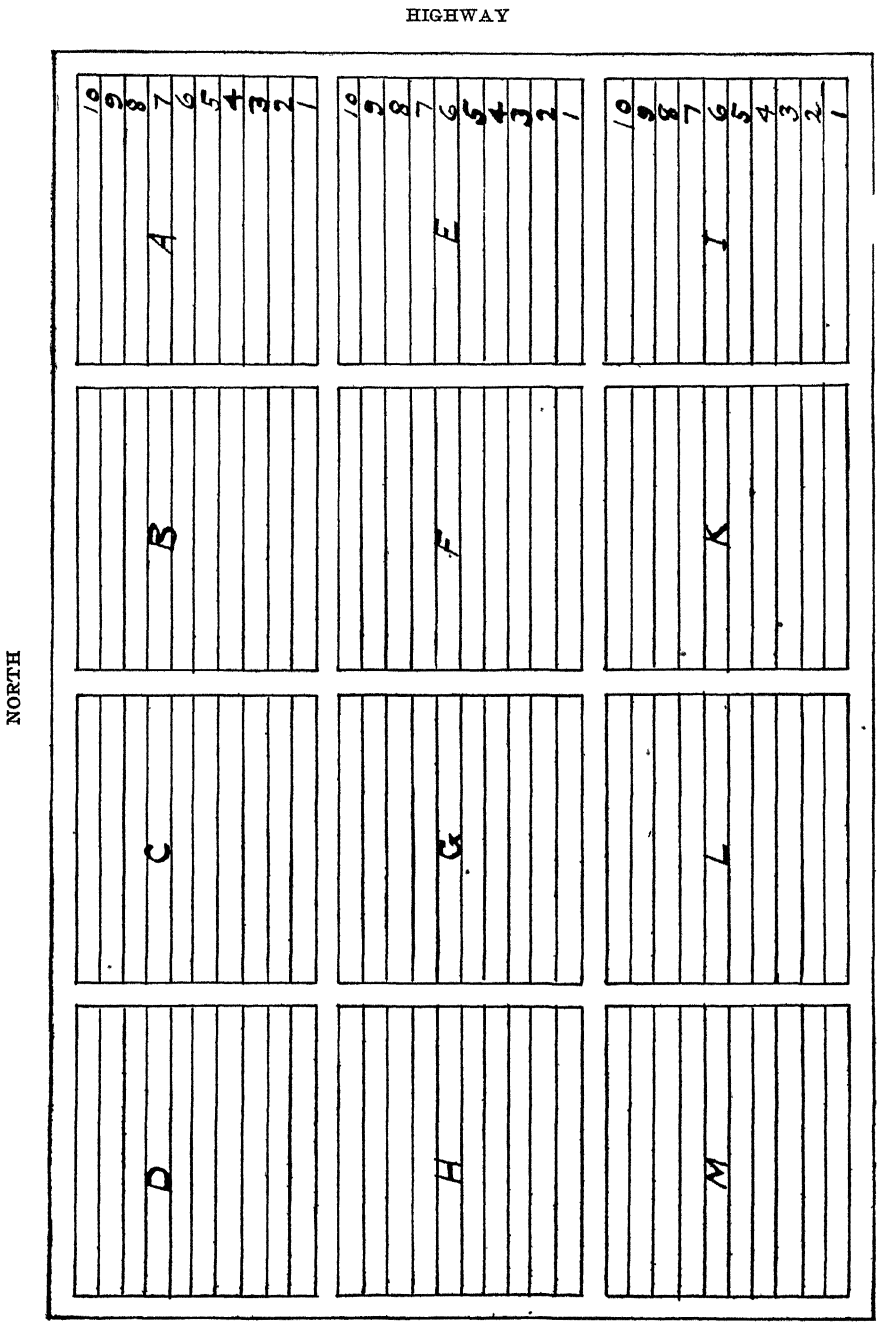
Soybeans have not been grown successfully in this experiment. In 1917 and 1918 so many beans were lost before threshing that only the total weight, as weighed in the field, can be given, and in 1919 they were so overgrown with weeds that they were not harvested separately.

The crop yields for 1918 and 1919 are given in the accompanying tables.

The full effect of the treatment in Rotation I cannot be estimated until after the second rotation has been completed, and in Rotations II and III two more crops must be harvested before all have been under the complete plan of fertilizing. However, the three crops of wheat that have thus far been harvested in each rotation furnish results that are suggestive, if not decisive.

In each rotation the wheat receives on Plot 2 a dressing of 200 pounds per acre of acid phosphate, following 100 pounds on oats and 200 pounds on corn. The increase for this treatment has been 13.12, 18.65 and 14.20 bushels, respectively, in the 3 rotations, bringing up the total yields to 26.97, 30.61 and 27.56 bushels.

The addition to this application of 15 pounds of muriate of potash for the wheat crop, following 15 pounds on corn and 10 pounds on oats, has been followed by increases of 17.80, 19.51 and 13.92 bushels, thus showing no decisive gain for the potash salt.



Arrangement of plots in fertilizing experiments with field crops
Mahoning County Experiment Farm

When nitrate of soda, 45 pounds per acre each on corn and wheat and 20 pounds on oats, has been added to the combination of acid phosphate and muriate of potash in Rotations II and III, thus making a complete fertilizer having approximately the percentage composition of a 3-12-3 fertilizer,* the increases have been 18.99 and 16.48 bushels, as against 18.65 and 14.20 bushels for acid phosphate alone in the same rotations.

A larger application of a complete fertilizer, made on Plot 6 of Rotations II and III, has brought up the total yields to 33.97 and 32.45 bushels, respectively, an increase in each case of 20 bushels or more.

This application is calculated to carry the same quantities of nitrogen, phosphorus and potassium as are given to Plot 8, which receives on corn a dressing of 6 tons of manure reinforced with acid phosphate, followed by 200 pounds of acid phosphate on wheat. The result of this treatment has been to increase the yields by 12.64 and 17.76 bushels, bringing up the totals to 26.97 and 29.36 bushels.

Rotation I carries two comparisons between acid phosphate, raw rock phosphate (floats) and steamed bonemeal; the floats being applied to the clover sod before it is plowed under for corn, while the other materials are applied to the surface in the usual manner. Computing corn at $1 a bushel, oats at 75 cents and wheat at $2, the value of the increase from these different treatments has been as below:

Plot		
2	Acid phosphate alone	$38.50
3	Floats alone	2.26
5	Steamed bonemeal alone	37.02
6	Acid phosphate and muriate of potash	54.61
8	Floats and muriate of potash	5.66
9	Steamed bonemeal and muriate of potash	32.01

The acid phosphate and steamed bonemeal are calculated to carry equal quantities of phosphorus, but the dressing of floats contains more than twice as much phosphorus as the other carriers.

Judging from the outcome of experiments with floats at Strongsville it is reasonable to expect a better showing later on, but none of our work justifies the expectation of reducing the cost of fertilizing, per unit of increase produced, by substituting the raw rock for acid phosphate.

*If 160 pounds of "filler" were added to this fertilizer it would make 400 pounds of a 2-8-2 formula.

TABLE 95.—Plan of fertilizing in farm crop rotation, Mahoning County Experiment Farm. Pounds per acre

Plot	On corn				On oats or soybeans			On wheat			Plot
	Acid phosphate	Muriate potash	Nitrate soda	Manure	Acid phosphate	Muriate potash	Nitrate soda	Acid phosphate	Muriate potash	Nitrate soda	
Rotation I: Corn-oats-wheat-clover. Clover plowed under.											
1											1
2	200				100			200			2
3	*										3
4											4
5	**				†			**			5
6	200	15			100	10		200	15		6
7											7
8	*	40									8
9	**	15			†	10		**	15		9
10											10
Rotation II: Corn-oats-wheat-clover: All crops removed.											
1											1
2	200				100			200			2
3	200	15			100	10		200	15		3
4											4
5	200	15	45		100	10	20	200	15	45	5
6	250	40	125					250	40	125	6
7											7
8				4 tons§				200			8
9				4 tons							9
10											10
Rotation III: Corn-soybeans-wheat-clover: All crops removed.											
1											1
2	200				100			200			2
3	200	15			100	10		200	15		3
4											4
5	200	15	45		100	10	20	200	15	45	5
6	300	40	200		300	40		300	40	200	6
7											7
8				6 tons§	180			300			8
9	200			10 tons§				200‡	40		9
10											10

*Floats, 27 percent, 700 pounds on corn only.
**Steamed bonemeal, 120 pounds.
†Steamed bonemeal, 60 pounds.
‡Also, steamed bonemeal, 100 pounds.
§Phosphated manure: 40 pounds acid phosphate per ton of manure.
(Untreated manure on Plot 8.)

TABLE 96.—Fertilizers and manure on CORN, Mahoning County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918 Yield Grain	1918 Yield Stover	1918 Increase Grain	1918 Increase Stover	1919 Yield Grain	1919 Yield Stover	1919 Increase Grain	1919 Increase Stover	2-year average Yield Grain	2-year average Yield Stover	2-year average Increase Grain	2-year average Increase Stover	Plot
	Rotation I: Corn-oats-wheat-mammoth clover. Clover plowed under after saving seed. Finely-ground limestone 2 tons per acre over all on corn.													
		Block A				Block B								
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	35.14	1,340	.....	.....	53.07	2,300	.....	.....	44.10	1,820	.....	.....	1
2	Acid phosphate, 200 lb	39.43	1,700	5.29	307	59.36	2,400	6.27	200	49.39	2,050	5.78	253	2
3	Floats, 700 lb	37.14	1,200	4.00	—247	52.21	2,350	—.91	250	44.66	1,775	1.54	2	3
4	None	32.14	1,500	.....	.....	53.14	2,000	.....	.....	42.64	1,750	.....	.....	4
5	Steamed bonemeal, 120 lb	39.14	1,500	5.62	183	58.36	2,300	5.70	233	48.75	1 900	5.66	208	5
6	Acid phosphate, 200 lb.; muriate potash, 15 lb.	39.86	1,400	4.95	267	70.86	2,400	18.67	267	55.36	1,900	11.81	267	6
7	None	36.29	950	.....	.....	51.71	2,200	.....	.....	44.00	1,575	.....	.....	7
8	Floats, 700 lb.; muriate potash, 40 lb.	40.29	1,490	4.81	323	52.36	2,400	5.15	327	46.32	1,945	4.98	325	8
9	Steamed bonemeal, 120 lb.; muriate potash, 15 lb.	43.43	1,460	8.76	77	55.00	2,300	12.29	353	49.21	1,880	10.52	215	9
10	None	33.86	1,600	.....	.....	38.21	1,820	.....	.....	36.03	1,710	.....	.....	10
	Average unfertilized yield	34.36	1,347	.....	.....	49.03	2,080	.....	.....	41.69	1,713	.....	.....	
	Rotation II: Corn-oats-wheat-medium clover. All crops removed. Finely-ground limestone 2 tons per acre over all on corn													
		Block E				Block F								
1	None	45.43	1,700	.....	.....	63.86	2,400	.....	.....	54.64	2,050	.....	.....	1
2	Acid phosphate, 200 lb	43.57	1,900	—2.15	67	67.21	2,700	3.95	267	55.39	2,300	.90	167	2
3	Acid phosphate, 200 lb.; muriate potash, 15 lb.	44.71	1,450	—1.29	—517	71.93	3,000	9.26	533	58.32	2,225	3.98	8	3
4	None	46.29	2,100	.....	.....	62.07	2,500	.....	.....	54.18	2,300	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 15 lb.; nit. soda, 45 lb.	48.00	1,900	5.04	17	77.93	3,300	21.05	933	62.96	2,600	13.04	475	5
6	Acid phos., 250 lb.; mur. potash, 40 lb.; nit. soda, 125 lb.	48.29	1,700	8.67	33	68.07	2,700	16.38	467	58.18	2,200	12.52	250	6
7	None	36.29	1,450	.....	.....	46.50	2,100	.....	.....	41.39	1,775	.....	.....	7
8	Phosphated stall manure, 4 tons	47.29	1,300	10.57	—67	71.43	3,000	25.05	833	59.36	2,150	17.81	383	8
9	Untreated stall manure, 4 tons	44.86	1,800	7.72	517	61.00	2,800	14.74	567	52.93	2,300	11.23	542	9
10	None	37.57	1,200	.....	.....	46.14	2,300	.....	.....	41.85	1,750	.....	.....	10
	Average unfertilized yield	41.39	1,612	.....	.....	54.64	2,325	.....	.....	48.01	1,968	.....	.....	

TABLE 97.—Fertilizers and manure on OATS, Mahoning County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918				1919				3-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	
	Rotation I: Corn-oats-wheat-mammoth clover. Clover plowed under after saving seed. Finely-ground limestone 2 tons per acre over all on corn.													
		Block D				Block A								
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	56.87	2,260	.....	.....	37.66	2,495	.....	.....	48.07	2,555	.....	.....	1
2	Acid phosphate, 100 lb	65.31	2,630	10.52	530	46.87	2,050	7.70	—330	55.83	2,603	8.64	140	2
3	(To have raw phosphate rock on clover. Sod for corn)	45.62	1,840	—7.08	—100	45.31	1,750	4.63	—515	46.83	2,167	.57	—205	3
4	None	50.62	1,780	.....	.....	42.19	2,150	.....	.....	45.42	2,280	.....	.....	4
5	Steamed bonemeal, 60 lb	62.81	2,590	10.94	650	48.44	2,050	4.83	62	53.65	2,450	7.38	181	5
6	Acid phosphate, 100 lb.; muriate potash, 10 lb	61.56	2,930	8.44	830	56.25	2,500	13.33	673	56.77	2,683	9.65	424	6
7	None	54.37	2,260	.....	.....	43.28	1,665	.....	.....	47.97	2,248	.....	.....	7
8	(To have raw phosphate rock on clover. Sod for corn)	52.81	2,510	—3.44	—23	44.69	2,720	3.28	845	47.66	2,558	—.43	142	8
9	Steamed bonemeal, 60 lb.; muriate potash, 10 lb	51.87	2,440	—6.25	—367	49.84	2,955	10.31	870	50.41	2,803	2.20	218	9
10	None	60.00	3,080	.....	.....	37.66	2,295	.....	.....	48.33	2,753	.....	.....	10
	Average unfertilized yield	55.46	2,345	.....	.....	40.20	2 151	.....	.....	47.45	2,459	.....	.....	
	Rotation II: Corn-oats-wheat-medium clover. All crops removed. Finely-ground limestone 2 tons per acre over all on corn.													
		Block H				Block E								
1	None	51.87	2,040	.....	.....	33.44	2,730	.....	.....	44.11	2,288	.....	.....	1
2	Acid phosphate, 100 lb	48.12	2,160	—1.98	110	41.09	2,765	3.54	83	48.49	2,675	3.54	345	2
3	Acid phosphate, 100 lb.; muriate potash, 10 lb	63.44	2,510	15.11	450	43.59	2,575	1.92	—58	54.37	2,797	8.59	426	3
4	None	46.56	2,070	.....	.....	45.78	2,585	.....	.....	46.61	2,412	.....	.....	4
5	Acid phos., 100 lb. mur. potash, 10 lb.; nitrate soda, 20 lb.	64.06	2,150	15.73	50	55.62	3,270	10.41	667	58.70	3,005	11.21	503	5
6	(Fertilized on corn and wheat only)	51.87	2,340	1.77	210	49.84	3,105	5.21	483	51.51	2,852	3.16	260	6
7	None	51.87	2,160	.....	.....	44.06	2,640	.....	.....	49.22	2,682	.....	.....	7
8	(Manured and fertilized on corn and wheat only)	60.62	3,140	5.31	730	45.94	3,030	2.56	552	54.22	3,025	4.11	324	8
9	(Manure on corn alone)	57.19	2,470	—1.56	—190	43.91	2,295	1.20	—22	52.24	2,662	1.25	—59	9
10	None	62.19	2,910	.....	.....	42.03	2,155	.....	.....	51.88	2 740	.....	.....	10
	Average unfertilized yield	53.12	2,295	.....	.....	41.33	2 527	.....	.....	47.95	2,530	.....	.....	

TABLE 98.—Fertilizers and manure on WHEAT, Mahoning County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918 Yield		1918 Increase		1919 Yield		1919 Increase		3-year average Yield		3-year average Increase		Plot
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
	Rotation I: Corn-oats-wheat-mammoth clover. Clover plowed under after saving seed. Finely-ground limestone, 2 tons per acre over all on corn.													
		Block C				Block D								
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	12.58	2,295	.....	.....	20.67	2,560	.....	.....	14.28	1,993	.....	.....	1
2	Acid phosphate, 200 lb.	23.00	2,320	10.45	207	28.33	3,500	8.61	983	26.97	2,615	13.12	746	2
3	(To have raw phosphate rock on clover sod for corn)	13.17	2,010	.64	78	20.25	2,185	1.47	—288	13.58	1,685	.15	—59	3
4	None	12.50	1,750	.....	.....	17.83	2,430	.....	.....	13.00	1,620	.....	.....	4
5	Steamed bonemeal, 120 lb	24.42	2,735	12.45	837	23.67	3,080	7.23	667	25.28	2,717	12.92	1,042	5
6	Acid phosphate, 200 lb.; muriate potash, 15 lb.	30.83	2,700	19.38	653	26.50	3,610	11.44	1,213	29.53	2,845	17.80	781	6
7	None	10.92	2,195	.....	.....	13.67	2,380	.....	.....	11.09	1,785	.....	.....	7
8	(To have raw phosphate rock and muriate potash on clover sod for corn)	13.33	2,150	2.27	130	17.17	2,370	.25	—15	12.61	1,793	.52	79	8
9	Steamed bonemeal, 120 lb.; muriate potash, 15 lb.	23.42	2,595	12.23	750	22.50	2,750	2.33	360	23.00	2,420	9.92	777	9
10	None	11.33	1,670	.....	.....	23.42	2,395	.....	.....	14.08	1,572	.....	.....	10
	Average unfertilized yield	11.83	1,977	.....	.....	18.90	2,441	.....	.....	13.11	1,742	.....	.....	
	Rotation II: Corn-oats-wheat-medium clover. All crops removed. Finely-ground limestone, 2 tons per acre over all on corn.													
		Block G				Block H								
1	None	8.67	1,980	.....	.....	12.42	1,605	.....	.....	12.64	1,592	.....	.....	1
2	Acid phosphate, 200 lb.	26.08	1,885	17.83	97	25.83	2,850	13.61	1,383	30.61	2,647	18.65	1,148	2
3	Acid phosphate, 200 lb.; muriate potash, 15 lb.	27.08	2,475	19.24	878	29.75	3,515	17.72	2,187	30.80	3,018	19.51	1,612	3
4	None	7.42	1,405	.....	.....	11.83	1,190	.....	.....	10.61	1,313	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 15 lb.; nit. soda, 45 lb.	25.67	2,460	16.70	898	29.42	3,235	15.23	1,687	30.64	2,928	18.99	1,461	5
6	Acid phos., 250 lb.; mur. potash, 40 lb.; nit. soda, 125 lb.	36.00	3,090	25.47	1,372	27.92	3,325	11.36	1,418	33.97	3,178	21.29	1,556	6
7	None	12.08	1,875	.....	.....	18.92	2,265	.....	.....	13.72	1,778	.....	.....	7
8	Acid phosphate, 200 lb. (To be manured on corn)	30.25	2,435	17.92	658	19.83	3,910	.36	1,478	26.97	2,932	12.64	1,153	8
9	(To be manured on corn)	16.00	3,140	3.42	1,462	20.67	2,860	.64	260	16.36	2,485	2.03	861	9
10	None	12.83	1,580	.....	.....	20.58	2,765	.....	.....	15.55	1,783	.....	.....	10
	Average unfertilized yield	10.25	1,710	.....	.....	15.94	1,956	.....	.....	13.13	1,616	.....	.....	

TABLE 99.—Fertilizers and manure on CORN and SOYBEANS, Mahoning County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918				1919				2-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Stover or straw	Grain	Stover or straw	Grain	Stover or straw	Grain	Stover or straw	Grain	Stover or straw	Grain	Stover or straw	
Rotation III: Corn-soybeans-wheat-medium clover. All crops removed. Finely-ground limestone 2 tons per acre over all on corn.														
	Corn	Block I				Block K								
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	14.86	700	.....	.....	35.93	1,300	.....	.....	25.39	1,000	.....	.....	1
2	Acid phosphate, 200 lb.	21.14	1,220	1.38	253	51.93	1,850	11.91	483	36.53	1,535	6.64	368	2
3	Acid phosphate, 200 lb.; muriate potash, 15 lb.	29.00	1,080	4.33	—153	63.64	2,800	19.52	1,367	46.32	1,940	11.92	607	3
4	None	29.57	1,500	.....	.....	48.21	1,500	.....	.....	38.89	1,500	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 15 lb.; nitrate soda, 45 lb.	37.86	1,500	7.53	117	66.64	2,500	18.64	800	52.25	2,000	13.08	458	5
6	Acid phos., 300 lb.; mur. potash, 40 lb.; nitrate soda, 200 lb.	35.43	1,800	4.33	533	69.36	3,000	21.58	1,100	52.39	2,400	12.95	816	6
7	None	31.86	1,150	.....	.....	47.57	2,100	.....	.....	39.71	1,625	.....	.....	7
8	Phosphated stall manure, 6 tons	48.14	1,950	14.93	717	83.71	3,400	34.35	1,033	65.92	2,675	24.62	875	8
9	Phosphated stall manure, 10 tons	48.86	2,100	14.24	783	85.50	3,800	34.36	1,167	67.18	2,950	24.30	875	9
10	None	36.00	1,400	.....	.....	52.93	1,900	.....	.....	44.46	2,150	.....	.....	10
	Average unfertilized yield	28.07	1,187	.....	.....	46.16	1,950	.....	.....	37.11	1,568	.....	.....	

	Soybeans: Total produce	1917—Block L		1918—Block M		2-year average		
		Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	
1	None	2,800	.....	2,150	.....	2,475	.....	1
2	Acid phosphate, 100 lb.	3,000	33	2,050	—183	2,525	—75	2
3	Acid phosphate, 100 lb.; muriate potash, 10 lb.	3,400	267	2,100	—217	2,750	25	3
4	None	3,300	.....	2,400	.....	2,850	.....	4
5	Acid phosphate, 100 lb.; muriate potash, 10 lb.; nitrate soda, 20 lb.	4,700	1,483	2,750	383	3,725	933	5
6	Acid phosphate, 300 lb.; muriate potash, 40 lb.	5,200	2,067	2,900	567	4,050	1,317	6
7	None	3,050	.....	2,300	.....	2,675	.....	7
8	Acid phosphate, 180 lb.	5,450	2,317	2,100	167	3,775	1,242	8
9	(To be manured and fertilized on corn and wheat only)	5,000	1,783	1,800	233	3,400	1,008	9
10	None	3,300	.....	1,200	.....	2,250	.....	10
	Average unfertilized yield	3,150	.....	2,012	.....	2,581	.....	

*Crop of 1919 could not be harvested.

TABLE 100.—Fertilizers and manure on WHEAT. Rotation III, Corn-soybeans-wheat-medium clover. All crops removed. Finely-ground limestone, 2 tons per acre over all on corn. Mahoning County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918—Block L				1919—Block M				3-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	9.58	1,165	.....	.....	18.08	2,315	.....	.....	13.55	1,767	.....	.....	1
2	Acid phosphate, 200 lb.	11.25	8.75	3.22	−353	31.17	3,680	14.45	1,517	27.56	2,580	14.20	823	2
3	Acid phosphate, 200 lb.; muriate potash, 15 lb.	16.50	1,710	10.03	418	21.92	3,735	6.56	1,723	27.08	3,058	13.92	1,310	3
4	None	4.92	1,355	.....	.....	14.00	1,860	.....	.....	12.97	1,738	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 15 lb.; nit. soda, 45 lb.	20.00	1,900	14.80	478	28.42	2,995	14.86	1,275	29.11	3,020	16.48	1,278	5
6	Acid phos., 300 lb.; mur. potash, 40 lb.; nit. soda, 200 lb.	23.67	2,230	18.20	742	31.00	3,640	17.89	2,060	32.45	3,437	20.16	1,691	6
7	None	5.75	1,555	.....	.....	12.67	1,440	.....	.....	11.95	1,750	.....	.....	7
8	Acid phosphate, 300 lb. (To be manured on corn)	21.33	2,070	15.69	692	28.50	3,590	16.28	2,007	29.36	3,088	17.76	1,424	8
9	Acid phos., 200 lb.; steamed bonemeal, 100 lb.; mur. potash, 50 lb. (To have phosphated manure on corn).	18.58	2,635	13.05	1,433	29.25	3,045	17.47	1,318	28.58	3,252	17.32	1,671	9
10	None	5.42	1,025	.....	.....	11.33	1,870	.....	.....	10.92	1,495	.....	.....	10
	Average unfertilized yield	6.42	1,275	.....	.....	14.02	1,871	.....	.....	12.35	1,687	.....	.....	

TABLE 101.—Residual effect on CLOVER of fertilizers applied to previous crops, Mahoning County Experiment Farm

Plot	Fertilizing materials on previous crop				Yield and increase in pounds per acre					
					1918		1919		3-year average	
	Acid phosphate	Muriate potash	Nitrate soda	Manure	Yield	Increase	Yield	Increase	Yield	Increase
	Rotation II: Corn-oats-wheat-clover: All crops removed.									
	Lb.	*Lb.*	*Lb.*	*Tons*	Block F		Block B		3-year average	
1	.....	.....	.....	.....	3,360	.....	2,462	.....	2,911	.....
2	500	.....	.....	.....	4,551	1,007	3,404	829	3,977	918
3	500	40	.....	.....	4,880	1,073	3,333	646	4,066	859
4	.....	.....	.....	.....	3,911	.....	2,800	.....	3,355	.....
5	500	40	110	.....	4,444	1,066	3,600	756	4,022	911
*6	500	80	250	.....	3,751	907	3,689	800	3,720	853
7	.....	.....	.....	.....	2,311	.....	2,933	.....	2,622	.....
8	360	.....	.....	4	2,684	438	3,911	993	3,297	715
9	.....	.....	.....	4	2,258	78	3,378	474	2,818	276
10	.....	.....	.....	.....	2,115	.....	2,889	.....	2,502	.....
	Average unfertilized yield.....				2,924	.....	2,771	.....	2,897	.....
	Rotation III: Corn-soybeans-wheat-clover; All crops removed.									
					Block K		Block R			
1	.....	.....	.....	.....	3,111	.....	3,049	.....	3,080	.....
2	500	.....	.....	.....	3,111	59	3,018	−52	3,064	3
3	500	40	.....	.....	3,911	919	4,089	999	4,000	959
4	.....	.....	.....	.....	2,933	.....	3,111	.....	3,022	.....
5	500	40	110	.....	3,733	889	3,733	643	3,733	766
*6	900	120	400	.....	4,711	1,955	3,733	663	4,222	1,309
7	.....	.....	.....	.....	2,667	.....	3,049	.....	2,858	.....
†8	720	.....	.....	6	4,356	1,511	3,911	826	4,133	1,168
9	600‡	40	.....	10	4,818	1,796	3,956	838	4,387	1,316
10	.....	.....	.....	.....	3,200	.....	3,156	.....	3,178	.....
	Average unfertilized yield.....				3,978	.....	3,091	.....	3,534	.....

*To compare with 8.
†To compare with 6.
‡And 100 pounds steamed bonemeal. To compare with variety field, O. A. E. S.

II. EXPERIMENTS WITH TRUCK CROPS

The plan of the experiments with truck crops is a duplicate of the similar experiments on the Washington County Experiment Truck Farm, but the work was started 2 years later on the Mahoning County farm, and the land available for it has proved to be much less suited to the work. The part on which Plots 1 to 16 are located had been in cultivation, while that covered by Plots 21 to 36 had been a part of the farmstead. The outcome of 3 years' work, as summarized in Table 110, is a demonstration of the futility of trying to grow truck crops on an exhausted soil.

Mahoning County Experiment Truck Farm: Plan of experiments in the use of fertilizers, manures and cover crops. Fertilizers and manures per acre. Plots 1-40 acre

SERIES A		SERIES B	
1	Unfertilized*	21	Unfertilized Mulched with straw
2	Shed manure 16 tons Acid phosphate, 400 lb	22	Unfertilized
3	Shed manure, 16 tons	23	Manure, 16 tons Acid phosphate, 400 lb Nitrate soda, 160 lb ; mur potash, 50 lb
4	Unfertilized	24	Manure, 16 tons
5	City manure, 16 tons	25	Manure, 16 tons Ground limestone, 1 ton
6	Acid phosphate, 800 lb Nitrate soda, 320 lb Muriate potash, 100 lb	26	Manure, 16 tons, ground limestone, 1 ton Acid phosphate 400 lb Nitrate soda, 160 lb
7	Unfertilized	27	Manure, 16 tons
8	Acid phosphate, 400 lb Nitrate soda 160 lb Muriate potash, 50 lb	28	Manure, 16 tons Acid phosphate, 400 lb Ground limestone, 1 ton
9	Acid phosphate, 400 lb Nitrate soda, 160 lb.	29	Unfertilized
10	Unfertilized	30	Acid phosphate, 400 lb Nitrate soda, 160 lb Cover crop Muriate potash, 50 lb
11	Acid phosphate, 400 lb	31	Acid phosphate, 400 lb Nit soda, 160 lb , mur potash, 50 lb Ground limestone, 1 ton
12	Nitrate soda, 80 lb Sulphate ammonia, 65 lb	32	Unfertilized
13	Unfertilized	33	Ground limestone, 1 ton
14	Nitrate soda, 160 lb (In two applications)	34	Acid phosphate 400 lb Nitrate soda, 160 lb Ground limestone, 1 ton
16	Nitrate soda, 160 lb. (In one application)	35	Unfertilized
16	Unfertilized	36	Acid phosphate, 400 lb Ground limestone, 1 ton

*Unfertilized, 1917 and 1918, manured, 16 tons per acre, 1919

Series A has received a basic dressing of finely ground limestone, spread over all the land at the rate of 2 tons per acre every second season On both series the crops are followed by a cover crop of rye

TABLE 102.—Fertilizers, lime and manure on TRUCK CROPS, Mahoning County Experiment Farm. Series A, 1917

Plot	Treatment per acre for each crop	Yield and increase in pounds per acre										Plot
		Sweet corn Block O		Cucumbers Block P		Cabbage* Block R		Tomatoes Block N		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
1	None	560		1,044				8,872		3,493		1
2	Shed manure, 16 tons; acid phosphate, 400 lb.	1,696	877	2,632	1,463			14,336	4,595	6,221	2,312	2
3	Shed manure, 16 tons	2,700	1,623	2,856	1,561			15,780	5,169	7,112	2,784	3
4	None	1,336		1,420				11,480		4,745		4
5	City manure, 16 tons	4,360	2,539	4,648	3,579			16,708	5,141	8,572	3,753	5
6	Acid phos., 800 lb.; mur. potash, 100 lb.; nit. soda, 320 lb.	2,532	227	2,636	1,917			10,740	−913	5,303	410	6
7	None	2,790		368				11,740		4,966		7
8	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	3,380	407	1,680	1,309			13,420	2,019	6,160	1,246	8
9	Acid phosphate, 400 lb.; nitrate soda, 160 lb	3,900	743	1,336	963			14,036	2,973	6,424	1,560	9
10	None	3,340		376				10,724		4,813		10
11	Acid phosphate, 400 lb.	4,000	967	1,604	1,185			12,280	1,843	5,961	1,332	11
12	Nitrate soda, 80 lb.; sulphate ammonia, 65 lb.	2,220	−507	312	−149			11,360	1,209	4,631	184	12
13	None	2,420		504				9,864		4,263		13
14	Nitrate soda, 160 lb. (in 2 applications)	2,620	207	228	−197			11,780	2,243	4,876	751	14
15	Nitrate soda, 160 lb. (in 1 application)	2,640	233	204	−143			11,188	1,977	4,677	689	15
16	None	2,400		268				8,884		3,851		16
	Average unfertilized yields	2,141		663				10,261		5,355		

*Cabbage not grown in 1917.

TABLE 103.—Fertilizers, lime and manure on TRUCK CROPS, Mahoning County Experiment Farm. Series A, 1918

Plot	Treatment per acre for each crop	Yield and increase in pounds per acre										Plot
		Sweet corn Block P		Cucumbers Block R		Cabbage Block N		Tomatoes Block O		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
1	None	680		2,592		4,940		3,412		2,906		1
2	Shed manure, 16 tons; acid phosphate, 400 lbs	2,800	2,020	2,652	1	13,800	7,087	8,144	4,771	6,849	3,470	2
3	Shed manure, 16 tons	2,560	1,680	3,792	1,083	12,080	3,593	9,512	6,177	6,986	3,133	3
4	None	980		2,768		10,260		3,296		4,326		4
5	City manure, 16 tons	3,060	2,140	6,300	4,012	13,160	4,313	7,860	4,388	7,595	3,713	5
6	Acid phos., 800 lb.; mur. potash, 100 lb.; nit. soda, 320 lb.	2,080	1,220	3,772	1,972	12,100	4,667	5,912	2,264	5,983	2,531	6
7	None	800		1,328		6,020		3,824		2,990		7
8	Acid phos., 400 lb.; mur. potash, 50 lb. nit. soda, 160, lb.	1,400	540	1,800	787	9,780	4,253	4,704	991	4,421	1,644	8
9	Acid phosphate, 400 lb., nitrate soda, 160 lb	1,100	180	1,192	493	11,580	6,547	4,640	1,037	4,628	2,065	9
10	None	980		384		4,540		3,492		2,349		10
11	Acid phosphate, 400 lb	1,740	900	1 300	736	6,940	2,240	6,972	3,373	4,238	1,812	11
12	Nitrate soda, 80 lb.; sulphate ammonia, 65 lb.	640	—60	452	—292	2,820	—2,040	4,472	767	2,096	—406	12
13	None	560		924		5,020		3,812		2,579		13
14	Nitrate soda, 160 lb. (in 2 applications)	480	—213	548	—387	5,220	573	4,252	609	2,625	146	14
15	Nitrate soda, 160 lb. (in 1 application)	400	—427	780	—165	4,080	—193	1,812	—1,661	1,768	611	15
16	None	960		956		3,900		3,304		2,277		16
	Average unfertilized yields	827		1,492		5,780		3,523		2,905		

TABLE 104.—Fertilizers, lime and manure on TRUCK CROPS, Mahoning County Experiment Station. Series A, 1919

Plot	Treatment per acre on each crop	Yield and increase in pounds per acre										Plot
		Sweet corn Block R		Cucumbers Block N		Cabbage Block O		Tomatoes Block P		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
1	None	.....	.....	4,704	.....	6,092	.....	7,060	.....	.....	.....	1
2	Shed manure, 16 tons; acid phosphate, 400 lb	5,060	—468	7,816	3,484	5,932	1,584	9,664	3,253	7,118	1,963	2
3	Shed manure, 16 tons	4,480	—144	7,360	3,400	6,800	4,196	10,076	4,315	7,179	2,942	3
4	None	3,720	.....	3,588	.....	860	.....	5,112	.....	3,320	.....	4
5	City manure, 16 tons	5,400	2,127	7,464	4,116	5,000	4,273	9,104	4,551	6,742	3,767	5
6	Acid phosphate, 800 lb.; muriate potash, 100 lb.; nitrate soda, 320 lb	4,980	2,153	5,456	1,748	3,628	3,035	7,652	3,657	5,429	2,798	6
7	None	2,380	.....	2,868	.....	460	.....	3,436	.....	2,286	.....	7
8	Acid phosphate, 400.; muriate potash, 50 lb.; nitrate soda, 160 lb	4,184	2,245	5,460	2,717	4,096	2,113	6,064	2,772	4,951	2,462	8
9	Acid phosphate, 400 lb.; nitrate soda, 160 lb	3,260	1,265	6,876	4,259	3,136	—369	5,332	2,184	4,651	1,959	9
10	None	1,056	.....	2,492	.....	5,028	.....	3,004	.....	2,895	.....	10
11	Acid phosphate, 400 lb	3,400	2,245	4,800	2,617	4,944	1,399	5,820	2,707	4,741	2,242	11
12	Nitrate soda, 80 lb.; sulphate, ammonia, 65 lb	1,580	129	2,116	243	680	—1,383	3,088	—135	1,866	—237	12
13	None	1,352	.....	1,564	.....	580	.....	3,332	.....	1,707	.....	13
14	Nitrate soda, 160 lb. (in 2 applications)	1,568	—159	1,864	155	520	—67	2,296	—1,228	1,562	—325	14
15	Nitrate soda, 160 lb. (in 1 application)	1,980	121	2,128	273	400	—193	3,152	—564	1,915	—151	15
16	None	2,476	.....	2,000	.....	600	.....	3,908	.....	2,246	.....	16
	Average unfertilized yields	2,903	.....	2,869	.....	2,270	.....	4,309	.....	3,088	.....	

TABLE 105.—Fertilizers, lime and manure on TRUCK CROPS, Mahoning County Experiment Farm. Series A, *3-year average, 1917-1919.

Plot	Treatment per acre for each crop	Yield and increase in pounds per acre										Plot
		Sweet corn		Cucumbers		Cabbage		Tomatoes		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
1	None	2,557	.....	2,780	.....	5,516	.....	6,448	.....	4,325	.....	1
2	Shed manure, 16 tons; acid phosphate, 400 lb.	3,185	810	4,367	1,649	9,866	4,335	10,715	4,206	7,033	2,750	2
3	Shed manure, 16 tons	3,247	1,053	4,669	2,015	9,440	3,894	11,789	5,220	7,286	3,045	3
4	None	2,012	.....	2,592	.....	5,560	.....	6,629	.....	4,198	.....	4
5	City manure, 16 tons	4,273	2,269	6,137	3,902	9,080	4,293	11,224	4,693	7,678	3,789	5
6	Acid phos., 800 lb.; mur. potash, 100 lb.; nit. soda, 320 lb.	3,197	1,200	3,955	1,879	7,864	3,851	8,101	1,669	5,779	2,150	6
7	None	1,990	.....	1,521	.....	3,240	.....	6,333	.....	3,271	.....	7
8	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	2,988	1,664	6,313	1,604	6,938	3,183	8,063	1,927	6,075	2,094	8
9	Acid phos., 400 lb.; nitrate soda, 160 lb.	2,753	895	3,135	1,905	7,358	3,089	8,003	2,065	5,312	1,988	9
10	None	1,792	.....	1,084	.....	4,784	.....	5,740	.....	3,433	.....	10
11	Acid phosphate, 400 lb.	3,047	1,371	2,568	1,513	5,942	1,819	8,357	2,641	4,978	1,836	11
12	Nitrate soda, 80 lb.; sulphate ammonia, 65 lb.	1,480	—80	960	—66	1,750	—1,711	6,307	614	2,624	—311	12
13	None	1,444	.....	997	.....	2,800	.....	5,669	.....	2,727	.....	13
14	Nitrate soda, 160 lb. (in 2 applications)	1,556	—55	880	—143	2,870	253	6,109	541	2,854	149	14
15	Nitrate soda, 160 lb. (in 1 application)	1,673	—24	1,037	—12	2,240	—193	5,384	—83	2,583	—78	15
16	None	1,945	.....	1,075	.....	2,250	.....	5,365	.....	2,659	.....	16
	Average unfertilized yields	1,957	.....	1,675	.....	4,025	.....	6,031	.....	3,436	.....	

*Cabbage, 2-year average.

TABLE 106.—Fertilizers, lime and manure on TRUCK CROPS, Mahoning County Experiment Farm. Series B, 1917

Plot	Treatment per acre for each crop	Yield and increase in pounds per acre										Plot
		Sweet corn Block B		Cucumbers Block A		Cabbage Block D		Tomatoes Block C		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
21	Straw mulch	1,470	—3,090	3,540	—696	4,640	—8,160	10,748	—6,668	5,100	—4,653	21
22	Cover crop only	4,560	.....	4,236	.....	12,800	.....	17,416	.....	9,753	.....	22
23	Manure, 16 tons; acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	5,980	2,310	6,492	—842	16,100	8,604	22,676	8,360	12,812	4,608	23
24	Manure, 16 tons	3,140	—530	8,164	830	14,052	6,556	21,252	6,936	11,652	3,448	24
25	Manure, 16 tons; ground limestone, 1 ton	4,620	950	6,416	—918	16,408	8,912	18,348	4,032	11,448	3,248	25
26	Manure, 16 T.; acid phos., 400 lb.; nit. soda, 160 lb.; ground limestone, 1 T.	3,520	—150	9,592	2,258	21,520	14,024	18,648	4,332	13,320	5,116	26
27	Manure, 16 tons	4,550	880	10,344	3,010	13,916	6,420	17,208	2,892	11,504	3,300	27
28	Manure, 16 tons	4,740	1,070	10,180	2,846	17,684	10,188	18,956	4,640	12,890	4,686	28
29	Cover crop only	2,780	.....	10,432	.....	2,192	.....	11,216	.....	6,655	.....	29
30	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb. Cover crop	3,310	157	12,756	1,909	5,460	1,781	12,520	1,597	8,511	1,361	30
31	Acid phos., 400 lb.; mur. potash, 50 lb.; nitrate soda, 160 lb.; ground limestone, 1 ton. Cover crop	5,190	1,663	13,072	1,811	3,844	—1,321	10,388	—241	8,123	478	31
32	Cover crop only	3,900	.....	11,676	.....	6,652	.....	10,336	.....	8,141	.....	32
33	Ground limestone, 1 ton. Cover crop	4,620	970	11,052	876	8,072	719	7,656	—2,971	7,850	—101	33
34	Acid phos., 400 lb.; nit. soda, 160 lb.; ground limestone, 1 ton. Cover crop	3,280	—120	11,512	2,836	9,232	1,177	10,956	39	8,745	983	34
35	Cover crop only	3,150	.....	7,176	.....	8,756	.....	11,208	.....	7,572	.....	35
36	Acid phos., 400 lb.; ground limestone, 1 ton. Cover crop	4,930	1,780	11,004	3,828	12,728	3,972	8,652	—2,556	9,328	1,756	36
	Average of check plots 22 and 29	3,670	.....	7,334	.....	7,496	.....	14,316	.....	8,204	.....	
	Average of check plots 29, 32 and 35	3,277	.....	9,761	.....	5,867	.....	10,920	.....	7,456	.....	

TABLE 107.—Fertilizers, lime and manure on TRUCK CROPS, Mahoning County Experiment Farm. Series B, 1918

Plot	Treatment per acre for each crop	Yield and increase in pounds per acre										Plot
		Sweet corn Block A		Cucumbers Block D		Cabbage Block C		Tomatoes Block H		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
21	Straw mulch	5,000	1,920	348	—2,128	10,440	—6,350	18,400	—1,504	8,547	2,015	21
22	Cover crop only	3,080	.....	2,476	.....	16,790	.....	19,904	.....	10,562	.....	22
23	Manure, 16 tons; acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	5,620	1,640	2,508	960	18,800	5,445	23,308	4,768	12,559	3,203	23
24	Manure, 16 tons	5,520	1,540	4,784	3,238	14,820	1,465	21,048	2,508	11,543	2,188	24
25	Manure, 16 tons, ground limestone, 1 ton	6,160	2,180	3,836	2,288	14,340	985	19,868	1,328	11,051	1,696	25
26	Manure, 16 tons; acid phos., 400 lb.; nit. soda, 160 lb.; ground limestone, 1 T.	5,840	1,860	3,988	2,440	14,980	1,625	20,708	2,168	11,379	2,024	26
27	Manure, 16 tons	5,880	1,900	3,900	2,352	13,880	525	21,048	2,508	11,177	1,822	27
28	Manure, 16 tons; acid phosphate, 400 lb.; ground limestone, 1 ton	5,640	1,660	6,244	4,696	14,580	1,225	21,764	3,224	12,057	2,702	28
29	Cover crop only	4,880	.....	620	.....	9,920	.....	17,176	.....	8,149	.....	29
30	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.; cover crop	2,800	—1,120	1,560	872	12,200	2,553	20,192	3,637	9,188	1,469	30
31	Acid phos., 400 lb.; mur. pot., 50 lb.; nit. soda, 160 lb.; ground limestone, 1 ton; cover crop	3,040	80	1,972	1,216	12,260	2,887	20,108	4,175	9,345	2,089	31
32	Cover crop only	2,000	.....	824	.....	9,100	.....	15,312	.....	6,809	.....	32
33	Ground limestone, 1 ton. Cover crop	2,280	—1,240	248	—513	10,700	867	16,540	2,709	7,442	456	33
34	Acid phos., 400 lb.; nit. soda, 160 lb.; ground limestone, 1 ton; cover crop	2,800	—2,240	1,488	789	16,080	5,513	17,440	5,095	9,452	2,289	34
35	Cover crop only	6,560	.....	636	.....	11,300	.....	10,868	.....	7,341	.....	35
36	Acid phosphate, 400 lb.; ground limestone, 1 ton; cover crop	5,2	—1,340	1,116	480	11,980	680	16,000	5,132	8,579	1,238	36
	Average of check plots 22 and 29	3,980	.....	1,548	.....	13,355	.....	18,540	.....	9,355	.....	
	Average of check plots 29, 32 and 35	4,480	.....	693	.....	10,107	.....	14,452	.....	7,433	.....	

TABLE 108.—Fertilizers, lime and manure on TRUCK CROPS, Mahoning County Experiment Farm. Series B, 1919

Plot	Treatment per acre for each crop	Yield and increase in pounds per acre										Plot
		Sweet Corn Block D		Cucumbers Block C		Cabbage Block B		Tomatoes Block A		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
21	Straw mulch	3,324	—876	3,152	—7,488	12,620	504	17,620	—1,716	9,179	—2,394	21
22	Cover crop only	4,200	.....	10,640	.....	12,116	.....	19,336	.....	11,573	.....	22
23	Manure 16 ton; acid phos., 400 lb.; muriate potash, 50 lb; nitrate soda, 400 lb.	7,000	2,680	11,128	4,990	14,176	2,888	26,820	5,570	14,781	4,032	23
24	Manure, 16 tons	6,240	1,920	9,712	3,574	10,140	—1,148	23,860	2,610	12,488	1,739	24
25	Manure, 16 tons; ground limestone, 1 ton	6,280	1,960	10,488	4,350	12,252	964	20,308	—942	12,332	1,583	25
26	Manure, 16 tons; acid phos., 400 lb.; nit. soda, 160 lb.; ground limestone 1 ton.	6,440	2,120	7,528	1,390	14,788	3,500	21,724	474	12,620	1,871	26
27	Manure, 16 tons	4,712	392	7,996	1,858	12,604	1,316	21,240	—10	11,638	889	27
28	Manure, 16 tons; acid phosphate, 400 lb.; ground limestone, 1 ton	7,220	2,900	6,772	634	15,880	4,592	26,816	5,566	14,172	3,423	28
29	Cover crop only	4,440	.....	1,636	.....	10,460	.....	23,164	.....	9,925	.....	29
30	Acid phos., 400 lb.; muriate potash, 50 lb; nitrate soda, 160 lb.; cover crop.	6,520	1,793	5,776	3,816	13,884	3,551	25,648	695	12,957	2,464	30
31	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.; ground limestone, 1 ton; cover crop.	7,720	2,707	7,372	5,088	14,880	4,673	30,012	3,269	14,996	3,934	31
32	Cover crop only	5,300	.....	2,608	.....	10,080	.....	28,532	.....	11,630	.....	32
33	Ground limestone, 1 ton: cover crop	6,360	673	2,552	—127	10,368	1,516	25,392	31	11,168	523	33
34	Acid phos., 400 lb., nitrate soda, 160 lb.; ground limestone, 1 ton; cover crop.	7,832	1,759	9,568	6,819	11,692	4,068	23,976	1,785	13,267	3,608	34
35	Cover crop only	6,460	.....	2,820	.....	6,396	.....	19,020	.....	8,674	.....	35
36	Acid phos., 400 lb.; nitrate soda, 160 lb.; ground limestone, 1 ton; cover crop.	4,760	—1,700	5,384	2,564	9,936	3,540	19,196	176	9,819	1,145	36
	Average check plots, 22 and 29	4,320	.....	6,138	.....	11,288	.....	21,250	.....	10,749	.....	
	Average check plots, 29, 32 and 35	5,400	.....	2,353	.....	8,979	.....	23,572	.....	10,076	.....	

TABLE 109.—Fertilizers, lime and manure on TRUCK CROPS, Mahoning County Experiment Farm. Series B, 3-year average, 1917-1919.

Plot	Treatment per acre for each crop	Yield and increase in pounds per acre										Plot
		Sweet corn		Cucumbers		Cabbage		Tomatoes		Average		
		Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	
21	Straw mulch	3,265	—682	2,347	—3,437	9,233	—4,669	15,589	—3,296	7,609	—1,677	21
22	Cover crop only	3,947	.....	5,784	.....	13,902	.....	18,885	.....	18,629	.....	22
23	Manure, 16 tons; acid phos., 400 lb.; mur. potash, 50 lb.; nitrate soda, 160 lb.	6,200	2,210	6,709	1,703	16,359	5,646	24,268	6,233	13,384	3,948	23
24	Manure, 16 tons	4,967	977	7,553	2,547	13,004	2,291	22,053	4,018	11,894	2,458	24
25	Manure, 16 tons; ground limestone, 1 ton	5,687	1,697	6,914	1,907	14,333	3,620	19,508	1,473	11,607	2,176	25
26	Manure, 16 tons; acid phos., 400 lb.; nit. soda, 160 lb.; ground limestone, 1 ton	5,267	1,277	7,036	2,029	17,096	6,383	20,360	2,325	12,440	3,004	26
27	Manure, 16 tons	5,047	1,057	7,413	2,407	13,467	2,754	19,832	1,797	11,440	2,004	27
28	Manure, 16 tons; acid phos. 400 lb.; ground limestone, 1 ton	5,867	1,877	7,732	2,725	16,048	5,345	22,512	4,477	13,040	3,604	28
29	Cover crop only	4,033	.....	4,229	.....	7,524	.....	17,185	.....	8,243	.....	29
30	Acid phos., 400 lb.: mur. potash, 50 lb.; nitrate soda, 160 lb.; cover crop	4,210	277	6,697	2,177	10,515	2,628	19,453	1,943	10,219	1,756	30
31	Acid phos., 400 lb.; mur. potash, 50 lb.; nitrate soda, 160 lb.; ground limestone, 1 ton; cover crop	5,317	1,483	7,472	2,660	10,328	2,080	20,169	2,401	10,821	2,156	31
32	Cover crop only	3,733	.....	5,103	.....	8,611	.....	18,060	.....	8,877	.....	32
33	Ground limestone, 1 ton; cover crop	4,420	134	4,617	41	9,713	1,034	16,529	—77	8,820	283	33
34	Acid phos., 400 lb. nitrate soda, 160 lb; ground limestone, 1 ton; cover crop	4,637	—200	7,523	2,126	12,335	3,586	17,457	2,305	10,488	1,954	34
35	Cover crop only	5,390	.....	3,544	.....	8,817	.....	13,699	.....	7,862	.....	35
36	Acid phos., 400 lb.; ground limestone, 1 ton; cover crop	4,970	—420	5,835	2,291	11,548	2,727	14,616	917	9,242	1,379	36
	Average of checks 22, and 29	3,990	.....	5,006	.....	10.713	.....	18,035	.....	9,436	.....	
	Average of checks 29, 32 and 35	4,385	.....	4,292	.....	8,317	.....	16,315	.....	8,327	.....	

TABLE 110.—Average annual value of TRUCK CROPS, Mahoning County Experiment Farm. Incrase due to treatment and net gain or loss per acre

Plot	Treatment per acre	Average value Dollars	Increased value Dollars	Cost of treatment Dollars	Net gain or loss Dollars
	Series A				
1	Unfertilized	86.50			
2	Shed manure, 16 tons; acid phos., 400 lb	140.66	55.00	46.00	9.00
3	Shed manure, 16 tons	145.72	60.90	40.00	20.90
4	Unfertilized	83.96			
5	City manure, 16 tons	153.56	75.78	40.00	35.78
6	Acid phos., 800 lb.; mur. potash, 100 lb.; nit. soda, 320 lb.	115.58	43.00	36.00	7.00
7	Unfertilized	65.42			
8	Acid phos., 400 lb.; mur. potash, 50 lb.; nit soda, 160 lb.	121.50	41.88	18.00	23.88
9	Acid phosphate, 400 lb.; nitrate soda, 160 lb	106.24	39.76	14.00	25.76
10	Unfertilized	68.66			
11	Acid phosphate, 400 lb	99.56	36.72	6.00	30.72
12	Nitrate soda, 80 lb.; sulphate ammonia, 65 lb	52.48	—6.22	8.00	—14.22
13	Unfertilized	54.54			
14	Nitrate soda, 160 lb. (in 2 applications)	57.08	2.98	8.00	—5.02
15	Nitrate soda, 160 lb. (in 1 application)	51.66	—1.56	8.00	—9.56
16	Unfertilized	53.18			
	Average value from basic treatments only	68.72			
	Series B				
21	Straw mulch	152.18	— 60.44		
22	Unfertilized	212.58			
23	Manure, 16 tons,; acid phos., 400 lb.; mur. pot., 50 lb.; nit. soda, 160 lb	267.68	78.96	62.00	16.96
24	Manure, 16 tons	237.88	49.16	44.00	5.16
25	Manure, 16 tons; limestone, 1 ton	232.20	43.48	50.00	—6.52
26	Manure, 16 tons; acid phos., 400 lb.; nit. soda, 160 lb.; limestone, 1 ton	248.80	60.08	64.00	—4.00
27	Manure, 16 tons	228.80	40.08	44.00	—3.92
28	Manure, 16 tons; acid phos., 400 lb.; limestone, 1 ton	260.80	72.08	52.00	20.00
29	Unfertilized	164.86			
30	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.	204.38	35.30	22.00	13.30
31	Acid phos., 400 lb.; mur. potash, 50 lb.; nit. soda, 160 lb.; limestone. 1 ton	216.42	43.34	28.00	15.34
32	Unfertilized	177.54			
33	Limestone, 1 ton	176.40	5.86	10.00	—4.14
34	Acid phos., 400 lb.; nit. soda, 160 lb.; limestone, 1 ton	209.76	39.08	24.00	15.08
35	Unfertilized	157.24			
36	Acid phos., 400 lb.; limestone, 1 ton	184.84	37.58	16.00	21.58
	Average value from basic treanment only	178.05			

FERTILIZERS AND MANURE ON STRAWBERRIES AND POTATOES GROWN IN ROTATION

Table 111 gives the outcome for 3 years of an experiment in which strawberries and potatoes are grown in rotation, the strawberries being plowed under as soon as the second crop is harvested and potatoes planted about the first of July. The next season strawberries are planted again and are given one season's culture in which to become established, thus making a 3-year rotation.

Thus far, acid hosphate seems to be the only fertilizer that has produced a definite increase in the strawberry crop; the nitrogen, whether in nitrate of soda or manure, having apparently reduced the yield.

TABLE 111.—Fertilizers and manure on STRAWBERRIES and POTATOES grown in rotation, Mahoning County Experiment Farm

Plot	Treatment per acre on each crop
1	None
2	Acid phosphate, 200 lb.
3	Acid phosphate, 200 lb.; muriate potash, 50 lb.
4	None
5	Acid phosphate, 200 lb.; muriate potash, 50 lb.; nitrate soda, 50 lb.
6	Acid hhosphate, 400 lb.; muriate potash, 100 lb.; nitrate soda, 100 lb.
7	None
8	Manure, 8 tons
9	Manure, 8 tons; acid phosphate, 200 lb.
10	None

Yield and increase in bushels per acre

Plot	Yield	Increase	Yield	Increase	Yield	Increase	Yield	Increase	Plot
	Strawberries—First season								
	1917—Block G		1918—Block K		1919—Block H		3-year average		
1	162.03	.....	204.22	.....	204.53	.....	190.26	.....	1
2	179.84	12.81	199.69	1.25	201.87	—4.27	193.80	3.26	2
3	185.62	13.59	206.58	13.91	212.19	4.43	201.46	10.64	3
4	177.03	.....	186.87	.....	209.37	.....	191.09	.....	4
5	134.06	21.88	211.87	20.31	193.75	—12.39	179.89	—4.65	5
6	145.62	10.78	213.59	17.34	192.19	—10.73	183.80	5.80	6
7	113.75	.....	200.94	.....	199.69	.....	171.46	.....	7
8	122.81	—1.77	222.50	21.98	171.72	—23.07	172.34	—.95	8
9	134.69	—.73	200.31	.20	174.69	—15.21	169.90	—5.25	9
10	146.25	.....	199.69	.....	185.00	.....	176.98	.....	10
*	149.76	.....	197.93	.....	199.61	.....	182.43	.....	
	Strawberries—Second season								
			1918—Block G		1919—Block K		2-year average		
1	.....	.....	160.00	.....	203.44	.....	181.72	.....	1
2	.....	.....	207.03	37.39	209.84	8.28	208.43	22.83	2
3	.....	.....	197.19	17.92	205.31	5.62	201.25	11.77	3
4	.....	.....	188.91	.....	197.81	.....	193.36	.....	4
5	.....	.....	181.56	2.08	160.62	—26.10	171.09	—12.01	5
6	.....	.....	179.84	9.79	154.69	—20.93	167.26	—5.57	6
7	.....	.....	160.62	.....	164.53	.....	162.57	.....	7
8	.....	.....	162.81	—7.19	152.03	—10.89	157.42	—9.04	8
9	.....	.....	172.34	—7.03	155.62	—5.68	163.98	—6.35	9
10	.....	.....	188.75	.....	159.69	.....	174.22	.....	10
*	.....	.....	174.57	.....	181.37	.....	177.97	.....	
	Potatoes								
	1917—Block H		1918—Block G		1919—Block K		3-year average		
1	67.50	.....	59.33	.....	46.00	.....	57.61	.....	1
2	93.67	25.45	67.00	—3.89	54.67	7.56	71.78	9.71	2
3	93.00	24.05	98.67	16.23	57.17	8.95	82.95	16.41	3
4	69.67	.....	94.00	.....	49.33	.....	71.00	.....	4
5	93.33	23.99	67.67	—12.77	82.67	31.45	81.22	14.22	5
6	116.67	47.67	70.00	3.11	100.67	47.56	95.78	32.78	6
7	68.67	.....	53.33	.....	55.00	.....	59.00	.....	7
8	96.67	28.00	83.33	30.33	80.67	23.78	86.89	27.37	8
9	112.00	42.33	80.67	28.00	114.67	55.89	102.11	42.07	9
10	68.67	.....	52.33	.....	60.67	.....	60.56	.....	10
*	68.63	.....	64.75	.....	52.75	.....	62.04	.....	

*Average unfertilized yields.

With potatoes also phosphorus seems to be the element most needed on this soil, although there is a further response to potassium, while the most profitable treatments have been the large dressing of the complete fertilizer on Plot 6 and the combination of acid phosphate and manure on Plot 9.

COMPARISON OF VARIETIES

DEPARTMENT OF AGRONOMY

CORN

The variety test of corn has included 15 varieties, and has been conducted two seasons with the result that Darke County Mammoth has given the largest yield, with Medina Pride second, Leaming (Frost's) third, and Ohio 84 fourth.

TABLE 112.—Comparison of varieties of CORN, Mahoning County Experiment Farm

Variety	Yield per acre		Average	
	1918	1919	Grain	Stover
	Bu.	*Bu.*	*Bu.*	*Lb.*
Clarage	64.79	75.70	70.24	2,796
Leaming (Frost)	73.33	76.28	74.80	3,225
Ohio 84	71.98	69.35	70.66	3,150
Medina Pride	74.13	78.82	76.47	2,850
White Cap	50.72	72.81	61.76	2,583
Darke County Mammoth	73.02	87.51	80.26	3,925
Norton's Dent	19.77	.....	.....	1,600
Golden Glow	57.10	80.42	68.76	2,675
Warren's Dent	64.24	.....	.....	3,100
Silver King	58.46	72.48	65.47	3,000
York's Yellow Dent	63.13	72.70	77.91	2,325
Pride of the North	60.18	69.17	64.67	3,325
Calico (Richmond)	57.98	.....	.....	2,000
Leetonia Pride	40.50	.....	.....	1,300
Van Wye's Yellow Dent	.....	73.25	.....	2,500

In a test of seven varieties of corn and one of sorghum in 1919 for silage, the Eureka gave the largest yield of green forage, the Old Virginia second, the Blue Ridge, third, and the Reid fourth.

TABLE 113.—Comparison of varieties of SILAGE CORN, Mahoning County Experiment Farm

Variety	Yield per acre
	Tons
Blue Ridge	10.41
Clarage	6.94
Leaming (Frost)	7.53
Darke County Mammoth	8.63
Reid (Orcutt)	9.29
Old Virginia	12.36
Eureka	13.41
Early Amber Sorghum	4.66

OATS

In the oats test 19 varieties have been tested for four consecutive seasons. The Ohio 6222 has given the largest average yield, the Ohio 6203 second, Silvermine third and the Big Four fourth.

TABLE 114.—Comparison of varieties of OATS, Mahoning County Experiment Farm

Variety	Yield per acre				Average	
	1916	1917	1918	1919	Grain	Straw
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lb.*
Ohio 7009	38.75	37.08	60.75	36.64	43.30	1,601
Ohio 8550	33 02	49.06	72.47	39.50	48.51	1,709
Burt	26.67	46.65	68.98	36.07	44.59	1,765
Ohio 6203	30.11	62.45	82.06	50.39	56.25	2,144
Ohio 201	29.48	54.78	69.09	42.99	49.08	3,010
Ohio 6222	30.11	66.50	87.89	44.24	57.18	2,502
Big Four	26.99	60.83	75.75	45.13	52.17	2,254
Silvermine	31.67	57.25	77.00	49.15	53.52	2,522
Swedish Select	21.99	56.29	75.02	32.32	46.40	2,300
Storm King	21.67	47.64	70.55	38.99	44.71	2,670
Joanette	27.92	58.01	70 86	44.40	50.30	2,785
Golden Rain	26.67	63.12	55.96	46.90	48.16	2,564
White Russian	23.02	.....	.....	.....	.....	.....
Victory	20.31	61.86	67.21	43.83	48.30	2,387
Corn Belt	18.13	54.21	58 26	45.97	44.14	2,455
Detmers New Bumper	23.65	48.48	66.05	43.62	45.45	2,511
Wideawake	22.61	54.16	70 13	34.87	45.44	2,742
Iowa 103	.....	57.38	59.30	39.82	52.17	1,994
Oderbrucker barley	12.29	14.48	22.08	27.71	19.14	1,944
Emmer	20.94	19.69	29.84	35.00	26.37	2,511
Blue Ribbon spring wheat	9.00	14.17	17.67	12.25	13.27	2,478

Date of seeding test.—For three seasons oats have been seeded at six different dates, all other conditions being as nearly the same as possible. In 1918, the season of largest yields, the earliest seeding, which was made the last week in March, gave the largest yield per acre, and each succeeding seeding, with one exception, regularly reduced the yield. In poor oat seasons the results have not been consistent with the above. In 1919 the lowest yield came from the earliest seeding.

TABLE 115.—Date of seeding OATS, Mahoning County Experiment Farm

Date seeded	Yield per acre			Average	
	1917	1918	1919	Grain	Straw
	Bu.	*Bu.*	*Bu.*		*Lb.*
March 26-27	.....	62.66	25.53	.....	2,200
April 4-5	55.62	.....	31.87	.....	2,375
April 11	55.47	.....	.....	.....	1,925
April 15-16	.....	58.75	33.44	.....	2,200
April 18-20	57.19	50.78	.....	.....	2,522
April 25-26	57.19	.....	38.75	.....	2,340
May 2-5	50.00	52.34	43.59	.....	2,640
May 9-11	53.44	39.69	.....	.....	1,935
May 14	.....	.....	37.19	.....	2,510
May 20	.....	38.12	.....	.....	2,180

Along with the variety oats, plots have been devoted to Oderbrucker barley, emmer and Blue Ribbon spring wheat each year. In comparing the yields it should be remembered that 32 pounds

constitute a bushel of oats and emmer, 48 pounds, a bushel of barley and 60 pounds, a bushel of wheat.

WHEAT

Nineteen varieties of wheat have been tested three seasons. The Fultz variety has averaged highest in yield, Ohio 9920 second, Ohio 127 third, and Gladden fourth.

TABLE 116.—Comparison of varieties of WHEAT, Mahoning County Experiment Farm

Variety	Yield per acre			Average	
	1917	1918	1919	Grain	Straw
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lb.*
Velvet Chaff	27.11	26.19	27.78	27.03	2,536
Fultz	38.56	32.71	33.50	34.92	2,750
Trumbull	34.00	32.73	27.65	31.46	2,507
Ohio 127	35.69	29.92	32.67	32.76	2,612
Fultzo-Mediterranean	28.69	23.57	27.89	26.72	2,288
Poole	28.56	30.89	27.79	29.08	2,520
Portage	31.34	24.91	32.20	29.48	2,388
Ohio 9920	35.91	29.41	36.03	33.78	2,737
Harvest King	31.22	30.89	30.37	30.83	2,428
Red Wave	28.92	32.28	26.56	29.25	2,742
Dawson's Golden Chaff	27.33	29 94	32.08	29.78	2,652
American Bronze	26.97	29.97	29.84	28.93	3,043
St. Louis Grand Prize	28.25	29.58	.....	.....	2,245
Gypsy	33.94	35.44	27.95	32.44	2,892
Gladden	36.61	30.35	30.53	32.50	3,053
Goens	25.36	21.61	27.64	24.87	2,238
Valley	32.69	35 52	28.67	32.29	2,762
Nigger	30.86	22.77	32.39	28.67	2,317
Marvelous	30.44	25.19	28.36	28.00	2,578
Red Wonder	31.19	21.02	29.11	27.11	2,248
Fulcaster	.....	29.03	.....	.....	.....
Mediterranean	.....	.....	24.25	.....	.....

A date-of-seeding wheat test has also been conducted for 3 years. Averaging these results the seedings made September 8 have given the largest yield, September 1 second, and September 15 third.

TABLE 117.—Date of seeding WHEAT, Mahoning County Experiment Farm

Date seeded	Yield per acre			Average	
	1917	1918	1919	Grain	Straw
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lb.*
September 1	26.67	26.00	25.17	25.95	2,997
September 8	31.00	24.25	25.17	26.81	2,522
September 15	27.50	24.25	24.50	25.42	2,388
September 22	19.00	23.67	21.58	21.42	2,352
September 30	25.17	21.83	.....	23.50	2,040
October 6	25.00	10.33	.....	.....	1,468
October 11	.....	.....	20.33	.....	2,280
October 20	.....	.....	17.17	.....	2,070

SOYBEANS

In the test of 1917 the Ebony variety gave the largest yield, Medium Green second and Mongol third. No tests were conducted in 1918 and 1919.

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BULLETIN
OF THE
Ohio Agricultural Experiment Station
NUMBER 344 JUNE, 1920

COUNTY EXPERIMENT FARMS IN OHIO

PART VIII

THE BELMONT COUNTY EXPERIMENT FARM

SECOND AND THIRD ANNUAL REPORTS FOR 1918 AND 1919

CHAS. E THORNE, DIRECTOR

CARY W. MONTGOMERY, CHIEF

J. J. LENTZ, FOREMAN

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment
March 1, 1919

Land and Buildings: original cost		$14,384.09
Permanent Improvements to March 1, 1918		1,830.64
Permanent Improvements made in 1918:		
Improvements on house No. 2	$225.38	
Shrubbery in yard, house No. 1	31.48	
Shrubbery in yard, house No. 2	16.50	
Planting grove	51.60	
Growing apple orchard	33.20	
Growing peach orchard	54.84	
Building 144 rods fence	203.05	
Manure shed added to horse barn	118.35	
Total permanent improvements, 1918		734.40
Total permanent investment		$16,949.13
Operating Equipment:		
Livestock: horses, $900; cattle, $785; hogs, $90	$1,775.00	
Machinery, tools and harness	826.75	
Crops, feeds, etc.: corn, $144; oats, $320; hay, $234; alfalfa, $13.50; silage, $180; straw, $32	923.50	
Seeds: corn, $36; soybeans, $17.50	53.50	
Fertilizers: limestone, $10; acid phosphate $38.25	48.25	
Building materials: lumber, $15; slag for cement, $60	75.00	
Fence materials: posts, $24; barb wire, $22.14; woven wire, $140	186.14	
Spray materials	3.00	
Sundries: office equipment, $20; containers, $10.90	30.90	
Total operating equipment		3,922.04
Total investment		$20,871.17

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment March 1, 1920

Original Cost: land and buildings		$14,384.09
Permanent Improvements to March 1, 1919		2,565.04
Permanent Improvements made in 1919:		
Repairing porch on house No. 2, labor and material	$ 71.01	
Installing furnace in house No. 2	185.00	
Cleaning well, walling and curbing, house No. 2	40.65	
Concrete top on well at barn	29.87	
Grove, trees and setting	14.90	
New addition to orchard, trees and labor	110.84	
Ornamental planting and care	19.00	
Water gap, labor and material	9.40	
Building fence, labor, gates and material	247.11	
Roofing residence No. 1, material and labor	364.25	
New milk house (not complete), labor and material	311.82	1,403.85
Total permanent investment		$18,352.98
Operating Equipment:		
Livestock: 3 horses, $475; 9 cattle, $540; 4 hogs, $145	$1,160.00	
Machinery, tools and harness	828.00	
Crops and feeds: corn, $310; oats, $75; mill feed, $25.50; hay, $500; straw, $24; silage, $200; tankage, $9.60	1,144.10	
Seeds: corn, $15; grass, $20	35.00	
Fertilizer	31.10	
Building material: lumber, $18; sand, $2.50; slag, $30	50.50	
Fence material: wire, $30; posts, $6; woven wire, $82.50	118.50	
Sundries: spray material, $12; gasoline, $1.40; containers, $20.35; paint, $4	37.75	
Chairs and tables	14.00	
Total operating equipment		3,433.95
Total investment		$21,786.93

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1919

Dr.

To Receipts

From County maintenance fund		$2,235.27
From Farm Sales:		
Livestock and products: hogs, $368.10; calves and hides, $30.48; cattle, $360; fees, $1.50	$760.08	
Crops: corn, $137.12; wheat, $293.73; hay, $79.20; seeds, $133.75	643.80	
Sundries: fence, $10; apple trees, $1.25; transportation, $3.89	15.14	1,419.02
Total receipts		$3,654.29
To balance forward from March 1, 1918		63.91
Total		$3,718.20

Cr.

By Expenditures

For Labor	$1,927.77	
For Current Expenses: seeds, $97.63; feed, $88.35; fertilizer, $146; binding matrial, $17.48; fence repair, $15.85; drainage maintenance, $8; livestock equipment, $22.05; veterinary service, $34.01; livestock fees, $18; horse shoeing, $30.40; livestock incidentals, $18.38; spray material, $6.74; containers, $11.55; machine hire, $97.12; implement repairs, $22.07; building maintenance, $199.63; office supplies, $15; publicity, $20.84; transportation, $97.06; communication, $30.77; engine maintenance, $5.65; fuel and light, $2; miscellaneous hardware, $13.52	1,018.10	
For Permanent Improvements:		
Drainage material	11.40	
Fence material	341.35	
Building material	38.50	
Concrete material	214.00	
Water supply	7.50	
Ornamental	29.88	
Forestry	10.00	
General	3.75	
		656.38
For Machinery and tools $50.78; harness, $2.30		53.08
Total expenditures		$3,655.33
By balance forward		62.87
		$3,718.20

For the year ending February 29, 1920

Dr.

To Receipts

From County maintenance fund		$2,253.38
From Farm Sales:		
Livestock and livestock products: cattle, $1,113.35; hogs, $390.21; calves and hides, $29.82	$1,533.38	
Crops: corn, $29.55; oats, $219.75; wheat, $750.70; apples, $34	1,034.00	
Fertilizer	62.50	
Machine hire	2.00	
		$2,631.88
Total receipts		$4,891.22
To balance forward, March 1, 1919		62.87
Total		$4,954.09

Cr.

By Expenditures

For Labor		$1,993.09
For Current Expenses:		
Building repair, $97.04; water system maintenance, $5.55; implement repair, $37.70; engine maintenance, 1.40; livestock equipment, $12.23; horse shoeing, $45.15; feed, $105.49; veterinary, $14.75; livestock fees, $7; livestock incidentals, $4.10; seeds and plants, $246.18; fertilizer and lime, $200.63; spray material, $5.75; binding material, $17.38; containers, $40.15; machine hire, $43.05; painting, $1; transportation, $120.09; communication, $123.39; publicity, $59.95; office supplies, $1; fuel and light, $3; miscellaneous hardware, $15.05	1,214.12	
For Permanent Improvements:		
Fence, $118.75; buildings, $573.35; concrete and masonry, $29.95; water system, $37.30; plantings, $53.60	812.95	
For Machinery, tools and harness	274.13	
For Livestock: cattle, $132.12; hogs, $140	272.12	
Total expenses		$4,566.41
By balance forward, February 29, 1920		387.68
		$4,954.09

CROP AND LABOR STATISTICS, 1918 AND 1919

Area of farm, 169 acres	1918	1919
Area cultivated	74.83 acres	76.51 acres

Plot Work

1918

Crop	Number of plots	Area acres	Total yield pounds	Yield per acre		
				Average	Highest	Lowest
Corn	20	1.66	5,105	43.76 bu.	62.14 bu.	28.57 bu.
Oats	8	.53	1,023	60. bu.	71.72 bu.	44.06 bu.
Barley	1	.07	96	30. bu.	.....	.....
Soybeans	9	.45	272	10. bu.	13.33 bu.	7.33 bu.
Wheat (winter)	20	1.66	2,123	21.23 bu.	36.5 bu.	8.17 bu.
Wheat (spring)	1	.07	56	14. bu.	.....	.....
Hay (cowpea)	1	.05	190	1.9 tons	.....	.....
Total	60	4.49	.....	.....	.....	.....

1919

Corn	20	1.67	8,395	71.81 bu.	94.28 bu.	55.71 bu.
Oats	10	.67	495	20.5 bu.	39.14 bu.	30.47 bu.
Soybeans	10	.67	*	.....	.....	.....
Wheat (winter)	20	1.5	2,776	30.73 bu.	44.67 bu.	22.5 bu.
Hay (clover)	10	1.	*	.....	.....	.....
Total	70	5.51	.....	.....	.....	.....

Field Crops

	1918			1919		
	Acres	Total yield pounds	Yield per acre	Acres	Total yield pounds	Yield per acre
Corn	7.	12,920	26.37 bu.	9.75	24,920	36.62 bu.
Silage corn	6.	89,370*	7.45 tons	6.5	82,030	6.31 tons
Corn (hogged)	1.	.....	.....	.....	.....	.....
Oats	12.5	23,712	59.28 bu.	3.5	3,072	27.43 bu.
Wheat	7.	8,308	19.77 bu.	15.	19,560	21.73 bu.
Soybeans	.....	.....	.....	1.25	900*	12. bu.
Rye	1.	957	17.05 bu.	1.	1,344	24. bu.
Hay (mixed)	31.	85,075	1.37 tons	16.5	48,520	1.47 tons
Hay (soybeans)	5.	6,200	.62 bu.	8.5	23,355	1.37 tons
Hay (timothy)	Orchard	2,740	.....	9.	†	.....
Total acres	70.5	.....	.....	71.	.....	.....

	1918	1919
Number of work horses	4	3
Number of crop acres per work horse	18.75	25.50
Hours of man labor for year beginning March 1	8 481	8,178
Hours of horse labor for year beginning March 1	5,495	5,509

*Estimated.
†1 stack.

FARM WORK AND IMPROVEMENTS FOR 1918 AND 1919

C. W. MONTGOMERY

The season of 1918 was favorable for crop growing from March 1 to harvest time, resulting in a fair crop of wheat and oats and a good crop of hay. After harvest it was very dry, resulting in a poor corn crop on those areas where the shale is near the surface and almost a failure of the grass seeding. However, one field that had received, on the sod the previous fall, about 8 tons of manure and was plowed in March, carried the corn crop through the drouth and produced a yield of 28.3 bushels of well-matured corn per acre.

One hundred and forty-four rods of fence have been put up at a cost of $205.05.

Repairs were made to the laborer's house at a cost for labor and material of $225.38.

Ornamental planting was made about the two houses at a cost for labor and plants of $47.98. A grove in which to hold field meetings was started at a cost for trees, labor and care of $51.60.

A manure pit was built for the horse barn at a cost for labor and material of $118.35.

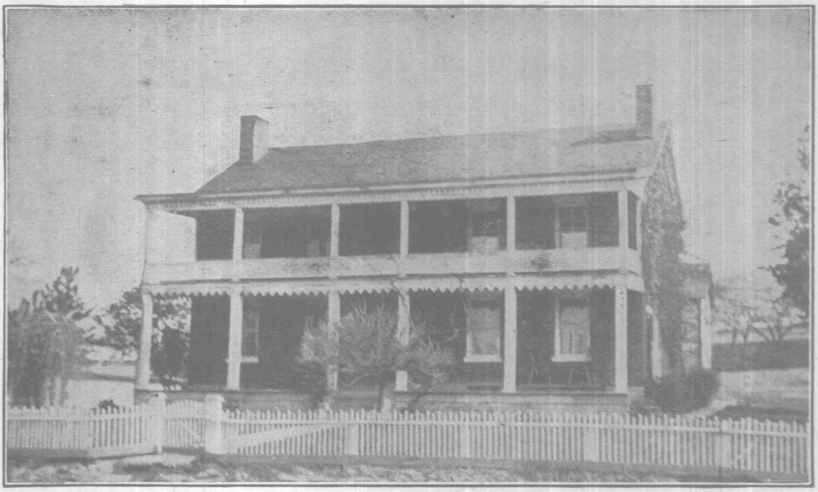
Replanting and care of the orchard cost, for trees, $27.54; for labor, $50.50; total, $78.04.

During a storm in August eight of the Jersey heifers were killed by lightning for which $360 in insurance was received. One Jersey heifer died.

The cost of keeping the herd of cows and the hogs will be found on another page. In both these enterprises it is to be noticed that no overhead charge is made.

The season of 1919 started in very wet and interfered with getting crops planted at the proper time. However, from May 20th seasonal conditions were favorable and resulted in good crops, except hay, the old meadows having "run out" and last year's seeding having failed. As a substitute for clover we sowed 3.5 acres to soybeans for hay. Part of the soybean hay was put into the barn in good condition and part, owning to the rainy season, became somewhat mouldy, but the cattle seem to relish all of the hay.

The grass seeding this year has made a fairly good stand except where the wheat went down and smothered the grass.



Residence, Belmont County Experiment Farm

New milk house and dairy barn, Belmont County Experiment Farm

PASTURE WORK

In 1917 some plots south of and along the pike were laid out and different treatments were applied at the rates per acre given below:

Plot 1—Phosphated manure, 8 tons per acre; ground limestone, 1 ton per acre; seeded.* Land not plowed.
Plot 2—Land plowed and seed bed prepared. Nitrate of soda, 100 lbs.; acid phosphate, 200 lbs.; muriate of potash, 50 lbs.; ground limestone, 1 ton; seeded.*
Plot 3—Disked and treated as Plot 2.
Plot 4—Check. No treatment.
Plot 5—Acid phosphate, 320 lbs.
Plot 6—Nitrate of soda, 150 lbs.
Plot 7—Ground limestone, 1 ton.
Plot 8—Nitrate of soda, 100 lbs.; acid phosphate, 200 lbs.; muriate of potash, 50 lbs.
Plot 9—Check. No treatment.

These plots are duplicated, except as to size, and are to be fertilized every other year. The plots are to be clipped in June and August each year. A block next to the pike and ditch is left untreated and unclipped. In February, 1918, Plots 2, 3, 11 and 12 were reseeded and a fairly good stand was obtained.

In pasture field 7, a block of about 2 acres was plowed, a seed bed prepared and seeded, but a stand of grass was not obtained; the block was reseeded in February, 1918, but no stand was obtained; it was seeded again in February, 1919, but this stand proved to be unsatisfactory; next to the woods some grass was noticed. During the summer the block was plowed, seed bed prepared and 200 pounds of acid phosphate and 1 ton of ground limestone per acre were applied. A mixture of 4 pounds each of timothy, red top and orchard grass; 6 pounds of bluegrass, and 2 pounds each of alfalfa, red clover, alsike and sweet clover was sown in August. The weather was ideal for seed germination but a very indifferent stand was obtained on part of the block and that part was harrowed in September and reseeded. In November a splendid catch of grass was noted.

Alfalfa has been seeded in several places, but a rather indifferent stand has been obtained. The seeding of August, 1919, is fairly good, but seems small for getting through the winter.

From the experience we have had in getting a "catch" of grass on the Belmont County Experiment Farm as well as on some other farms, it would seem to be a poor policy to let land become reduced in fertility and humus content. It would also seem that when the pastures have "run out" and the land will admit of plowing without

*Four pounds each of timothy, red top and orchard grass; 6 pounds of bluegrass and 2 pounds each of alfalfa, red clover and alsike per acre.

eroding, the quickest way to get a good sward of grass and to introduce legumes like alfalfa or alsike clover is to plow, prepare a good seed bed, and sow seed.

SUMMARY DAIRY REPORT

For the year beginning March 1, 1918, and ending February 28, 1919

DEBITS		CREDITS	
Item	Value	Item	Value
Inventory March 1, 1918:		Inventor February 28, 1919:	
Dairy barn	$1,200.00	Dairy barn	$1,200.00
Silo	375.00	Silo	375.00
Corn crib	50.00	Corn crib	50.00
Barnyard and bull pasture:		Barnyard and bull pasture:	
2 acres	160.00	2 acres	160.00
21 heifers	1,050.00	1 cow	100.00
		11 heifers	770.00
		1 calf	35.00
Total inventory	$2,835.00	Total inventory	$2,690.00
Feed consumed	$1,037.60	Milk used	75.00
Pasture	154.71	Insurance, 8 heifers killed by lightning August 10	360.00
Labor, 420 man hours at 30c	126.00	Hides on same	30.48
Miscellaneous expense*	12.05	Manure produced†	213.11
Interest on investment at 6%	167.10	To balance (loss)	993.87
	$4,332.46		$4,332.46

Prices of feeds: Corn and oats, ground, $2.90 per 100 pounds; corn silage, $8.25 per ton; hay, $20 per ton; cottonseed meal, $2.90 per 100 pounds.

*Miscellaneous expense: Cow ties, dehorning cattle, appraising dead cattle and auto mileage.

†Manure produced was figured from table for Trumbull County Experiment Farm. For every 1,000 pounds live weight 12,600 pounds manure was figured for the 6 months cattle were on feed, three-fourths of this or 4.72 tons was figured possible to be saved and worth on the farm for crop production $3.80 per ton. For the 6 months the cattle were on pasture the amount of manure was figured the same, but a value of $1 per ton was placed on the same for improvement of the pasture.

Cattle killed by lightning were appraised $485.

The heifers listed in the foregoing table were purchased with the idea of breeding and selling as they freshened. It is just probable that we sold before the great advance in dairy cattle was noted, but even Jersey cattle cannot be raised for a "song." Feed and labor are required.

EXPERIMENTS IN THE MAINTENANCE OF SOIL FERTILITY

Because of the hilly topography of the greater part of Belmont County it seems desirable to keep the land in grass as much of the time as practicable, to avoid the washing which follows when hillsides are plowed. This practice is in conformity with the general experience of the farmers of the county, the area in the cereal crops having steadily diminished during the last 60 years, while that in meadows has as steadily increased. A 5-year rotation has therefore been adopted in which corn and wheat, each grown one season, will be followed by 3 years of clover and timothy, thus requiring but one plowing in the 5 years of the rotation.

Similar rotations, in which timothy is allowed to occupy the land for an even longer period, and too often without any manuring or fertilizing except that given to one of the grain crops, have

caused the opinion that timothy is a particularly exhaustive crop. It seems well, therefore, to study the effect of fertilizers and manure on the timothy crop itself and through this crop on the general rotation. An experiment has therefore been planned in which the fertilizing materials are to be distributed as shown in Table 118.

TABLE 118.—Plan of fertilizing in 5-year rotation of corn, wheat, clover, timothy and timothy, Belmont County Experiment Farm

Plot	Fertilizing material: pounds per acre for entire rotation	Distribution of fertilizers—pounds per acre				
		Corn	Wheat	Clover	Timothy	Timothy
1	None					
2	Acid phosphate, 600 lb	200	200		200	
3	Acid phosphate, 600 lb Muriate of potash, 48 lb	200 16	200 16		200 16	
4	None					
5	Acid phosphate, 600 lb Muriate of potash, 48 lb Nitrate of soda, 120 lb	200 16 40	200 16 40		200 16	 40
6	Acid phosphate, 600 lb Muriate of potash, 48 lb Nitrate of soda, 120 lb Ground limestone, 2 tons	200 16 40 2 tons	200 16 40		200 16	 40
7	None					
8	Manure, 10 tons	5 tons			5 tons	
9	Manure, 10 tons Acid phosphate, 400 lb	5 tons 200			5 tons 200	
10	None					

The clover sown on Block A in this experiment failed, so that corn and wheat are the only crops thus far harvested. The record of these crops is given in Table 119, and indicates that phosphorus and lime are the most important constituents of a fertilizer for this soil.

TABLE 119.—Fertilizers, manure and limestone on CORN and WHEAT in rotation with clover, timothy and timothy, Belmont County Experiment Farm. Yield and increase per acre

Plot	Treatment per acre	1918				1919				3-year average				Plot
		Yield		Increase		Yield		Increase		Yield		Increase		
		Grain	Stover or Straw	Grain	Stover or Straw	Grain	Stover or Straw	Grain	Stover or Straw	Grain	Stover or Straw	Grain	Stover or Straw	
	Corn	Block B				Block E				Average				
		Bu.	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	*Bu.*	*Lb.*	
1	None	35.71	2,400	.....	.....	62.86	2,640	.....	.....	58.57	3,613	.....	.....	1
2	Acid phosphate, 200 lb	38.57	2,700	.95	233	68.57	3,000	6.43	490	65.71	4,067	6.27	563	2
3	Acid phosphate, 200 lb.; muriate potash, 16 lb	42.86	2,700	3.34	167	62.86	2,600	1.43	220	64.76	3,767	4.45	373	3
4	None	41.43	2,600	.....	.....	60.71	2,250	.....	.....	61.19	3,283	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 16 lb.; nitrate soda, 40 lb.	41.43	2,900	.48	300	70.00	2,600	9.05	283	63.33	3,733	3.81	350	5
6	Acid phos., 200 lb.; mur. pot., 16 lb.; nit. soda, 40 lb.; ground limestone, 2 tons	45.71	2,700	5.23	100	74.29	2,400	13.10	17	68.10	3,367	10.24	—117	6
7	None	40.00	2,600	.....	.....	61.43	2,450	.....	.....	56.19	3,583	.....	.....	7
8	Manure, untreated, 10 tons	42.86	2,600	6.67	167	77.86	3,850	15.00	1,150	68.34	4,183	11.67	672	8
9	Manure, untreated, 10 tons; acid phosphate, 200 lb	48.57	3,000	16.19	733	80.00	3,600	15.72	650	70.48	4,133	13.34	694	9
10	None	28.57	2,100	.....	.....	65.71	3,200	.....	.....	57.62	3,367	.....	.....	10
	Average unfertilized yield	36.43	2,425	.....	.....	62.68	2,623	.....	.....	58.39	3,474	.....	.....	
	Wheat	Block A				Block B				2-year average				
1	None	12.17	2,170	.....	.....	26.33	2,120	.....	.....	19.25	2,145	.....	.....	1
2	Acid phosphate, 200 lb	19.33	1,840	5.88	—420	32.67	2,940	7.01	797	26.00	2,390	6.44	188	2
3	Acid phosphate, 200 lb.; muriate potash, 16 lb	20.00	1,900	5.28	—450	33.67	3,230	8.67	1,063	26.83	2,565	6.97	306	3
4	None	16.00	2,440	.....	.....	24.33	2,190	.....	.....	20.16	2,315	.....	.....	4
5	Acid phos., 200 lb.; mur. potash, 16 lb.; nit. soda, 40 lb.	21.17	1,930	6.95	—250	33.17	3,210	9.12	1,087	27.17	2,570	8.03	418	5
6	Acid phos., 200 lb.; mur. potash, 16 lb.; nit. soda, 40 lb.	23.83	2,370	11.38	450	34.67	3,120	10.89	1,063	29.25	2,745	11.13	756	6
7	None	10.67	1,660	.....	.....	23.50	1,990	.....	.....	17.08	1,825	.....	.....	7
8	Manure on corn and timothy	11.33	1,620	1.49	43	25.17	2,290	2.00	313	18.25	1,955	1.74	178	8
9	Manure and acid phosphate on corn and timothy	15.17	1,990	6.17	467	33.83	2,970	11.00	1,007	24.50	2,480	8.58	752	9
10	None	8.17	1,410	.....	.....	22.50	1,950	.....	.....	15.33	1 680	.....	.....	10
	Average unfertilized yield	11.75	1 920	.....	.....	24.16	2,062	.....	.....	17.95	1,991	.....	.....	

COMPARISON OF VARIETIES

DEPARTMENT OF AGRONOMY

CORN

In the variety test of corn seven varieties have been included. Averaging the 3 years' work the Darke County Mammoth is first in yield, Cook's 75 second, Leaming (P. D.) third and L.W. Hays (local) fourth.

TABLE 120.—Comparison of varieties of CORN, Belmont County Experiment Farm

Variety	Yield per acre			3-year average	
	1917	1918	1919	Grain	Stover
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lb.*
Darke County Mammoth	76.07	80.61	89.47	82.05	5,025
Leaming (P. D.)	82.51	67.26	76.61	75.46	4,083
Cook's 75	75.36	79.17	88.39	80.97	6,171
Ohio 84	59.64	70.13	78.75	69.51	5,425
White Cap	53.21	72.98	73.39	66.53	5,263
L. W. Hays (local)	68.93	.....	81.96	75.44	4,349
Clarage	69.64	68.22	80.89	72.92	3,729

OATS, BARLEY AND SPRING WHEAT

Six varieties of oats have been tested, but only three of them for 3 years. As the third season was very poor for oats, it is more accurate to use for the average the 2 years in which all varieties were tested. Accordingly the Big Four is first, Ohio 6203 second and Ohio 6222 third. The 3-year average yield of Blue Ribbon spring wheat is 9.67 bushels and of Oderbrucker barley 26.25 bushels.

TABLE 121.—Comparison of varieties of OATS, spring wheat and barley, Belmont County Experiment Farm

Variety	Yield per acre			2-year average	
	1917	1918	1919	Grain	Straw
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lb.*
Ohio 7009	45.89	44.73	37.50	45.31	1,535
Ohio 6203	60.55	67.59	39.14	64.07	2,312
Ohio 6222	55.05	70.28	30.47	62.66	2,705
Big Four	59.14	75.80	.....	67.47	2,835
Silvermine	58.90	59.38	.....	59.14	2,565
Wideawake	54.22	58.43	.....	56.32	2,679
Blue Ribbon Spring Wheat	*7.50	14.00	7.50	9.67	1,942
Oderbrucker Barley	20.00	30.00	28.75	26.25	2,112

*Defective stand.

SOYBEANS

Two years' tests of soybeans are reported. Ohio 9016 has given slightly the largest yield, with the Elton second and the Medium Green third.

TABLE 122.—Comparison of varieties of SOYBEANS, Belmont County Experiment Farm

Variety	Yield per acre			2-year average	
	1917	1918	1919‡	Grain	Straw
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lb.*
Ohio 9100	12.00	8.56	.....	10.28	2,900
Elton	15.75	8.11	.....	11.93	2,795
Ebony	10.42	6.33	.....	8.37	2,597
Ohio 9035	*5.59	9.67	.....	7.63	4,052
Ohio 9016	13.00	11.67	.....	12.33	3,052
Medium Green	12.75	11.00	.....	11.87	2,847
New Era Cowpea	†	†	.....	.....	4,487

*Ripened by frost.
†Frosted; not threshed.
‡Not harvested.

BULLETIN

OF THE

Ohio Agricultural Experiment Station

NUMBER 344 JUNE, 1920

COUNTY EXPERIMENT FARMS IN OHIO

PART IX

THE MADISON COUNTY EXPERIMET FARM

SECOND AND THIRD ANNUAL REPORTS FOR 1918 AND 1919

CHAS. E. THORNE, DIRECTOR

CARY W. MONTGOMERY, CHIEF

R. R. BARKER, SUPERINTENDENT
J. J. SITES, FOREMAN

FINANCIAL SUMMARY

Inventory of Permanent Investment Costs and Operating Equipment

March 1, 1919

Land: 166 acres bequeathed to county valued at $125 per acre		$20,875.00
Permanent Improvemnts to March 1, 1918		2,491.00
Permanent Improvements made in 1918:		
Building: erecting foreman's house, $3,819.10; interior decorating, $107.32	$3,926.42	
Water supply: cellar drain, kitchen sink drain and cistern overflow, foreman's house, $49.23; cellar drain for tenant house, $9.35; well, 121 feet 4 inches deep, $336.09; 140-barrel cistern, $90.19	484.86	
Tile drainage, 1,738 rods at 96.4 cents per rod	1,671.58	
Total permanent improvements for 1918		$6,082.86
Total permanent investment		$29,448.86
Operating Equipment:		
Livestock: 3 horses, $465; 1 yearling colt, $40	$505.00	
Machinery, tools and harness	714.05	
Scales	96.00	
Crops, feed, etc.: hay, $112; corn, $360; wheat, $8; oats, $37.50; salt, $2.35	519.85	
Seeds: soybeans, $20; clover, $95	115.00	
Fertilizer	12.00	
Containers	16.50	
Poultry fence	19.00	
Total operating equipment		1,997.40
Total investment		$31,446.26

March 1, 1920

Land: 166 acres bequeathed to county valued at $125 per acre		$20,875.00
Permanent Improvements made to March 1, 1919		8,573.86
Permanent Improvements made in 1919:		
Addition to barn	$1,291.90	
Garage and chicken house	215.89	
Well top, engine base and water pipe line	58.53	
Fences	102.42	
Silo erected	480.30	
Installing wagon scales	167.52	
Painting tenant house	85.70	
Grading and ornamental planting of residence grounds	44.94	
Concrete walk and cistern top	11.90	
		$2,459.40
Total permanent investment		$32,108.26
Operating Equipment:		
Livestock: 2 horses, $450	$ 450.00	
Machinery, tools and harness	1,289.50	
Crops, feeds: corn, $1,133; oats, $137; hay, $350; silage, $235	1,855.00	
Seeds: clover	135.00	
Lumber	25.00	
Wagon scales	160.00	
Sundries: salt, $2; office desk, $12	14.00	
Total operating equipment		3,939.00
Total investment		$36,047.26

RECEIPTS AND EXPENDITURES

For the year ending February 28, 1919

Dr.

To Receipts

From County:		
Balance in Treasury, March 1, 1918	$ 372.82	
Maintenance fund	6,773.50	
		$7,146.32
From Farm Sales:		
Crops: corn, $642.59; oats, $471.38; wheat, $218.05; hay, $1,033.42; straw, $5.91; fodder, $17.64	$2,363.99	
Seeds	132.97	
Lumber	50.00	
Sundries: containers, 70 cents; communication, $2.55; fuel, $12.45	15.70	2,587.66
Total receipts		$9,733.98

Cr.

By Expenditures

For Labor	$1,341.55	
For Current Expenses: seeds, $33.38; feeds, $1.93; fertilizer, $69.96; binding material, $14.55; containers, $11.49; machine hire, $186.02; plot fixtures, $3.80; horse shoeing, $10.25; veterinary services, $15; livestock incidentals, $2.35; building maintenance, $4.50; drainage maintenance, 80 cents; implement maintenance, $51.11; engine maintenance, 50 cents; communication, $38.62; transportation $88.54; publicity, $2.95; fuel and light, $25.07; miscellaneous hardware, $7.85; drafts, 60 cents; clearing woodlot, $18; trimming hedge, $17.44	604.71	
For Permanent Improvements: building house, $3,835.42; concrete masonry, $77.59; water supply, $356.69; drainage, $965.27	5,234.97	
For Machinery, tools and harness	264.97	
For Horses	365.00	
Total expenditures		$7,811.20
By balance forward, February 29, 1919		1,922.78
		$9,733.98

RECEIPTS AND EXPENDITURES

For the year ending February 29, 1920

Dr.

To Receipts

From Farm Sales:		
Livestock: horse, $50	$ 50.00	
Crops: corn, $281.05; oats, $525.08; hay, $552.63; wheat, $671.49	2,030.25	
Seeds	33.75	
Sundries: old sacks, 95 cents; fertilizer, $30.84; cord wood, $36; telephone rent, $12.60; old timber, $2...	82.39	$2,196.39
From County: maintenance fund		1,883.28
Refund from Lumber and Coal Company		4.50
Total receipts		$4,084.17
To balance forward, March 1, 1919		1,922.78
		$6,006.95

Cr.

By Expenditures

For Labor		$1,849.12
For Current Expenses: feeds, $11; livestock equipment, $19.30; horse shoeing, $24.90; veterinary, $3.25; livestock incidentals, $8.55; seeds and plants, $120.51; fertilizer, $241.46; spray material, $4.80; containers, $5.95; binding material, $26.50; machine hire, $237.02; plot fixtures, $12.60; building repairs, $12.04; fence maintenance, $7.10; water supply maintenance, $5.98; implement maintenance, $17.96; engine maintenance, $5.80; transportation, $92.10; communication, $39; publicity, $58.25; office supplies, $13.20; fuel and light, $7.88; miscellaneous hardware, $20.92; painting, $5.25	1,001.32	
For Permanent Improvements: building material, $1,495.73; concrete, $270.83; water system, $75.75; fence, $110.21; drain tile, $29.50; plantings, $31.33; lumber for scales, cinders, $27.84	2,041.18	
For Machinery, tools and harness	507.20	
Total expenditures		$5,398.82
By balance forward, February 29, 1920		608.13
		$6,006.95

CROP AND LABOR STATISTICS FOR 1918 AND 1919

Area in farm, 166 acres	1918	1919
Area in farmstead	5 acres	2.71 acres
Area cultivated	127.1 acres	130.34 acres
Permanent pasture	9 acres	14.07 acres
Woodlot	9 acres	8.43 acres
Public roads and uncultivated	9.9 acres	2.22 acres
Farm roads and paths	6 acres	7.25 acres

PLOT WORK

1918

	Number of plots	Area acres	Total yield pounds	Yield per acre		
				Average	Highest	Lowest
Oats	5	.5	615	38.44 bu.	45.31 bu.	35. bu.
Barley	1	.1	61	12.71 bu.	.....	.....
Wheat	10	1.0	819	13.65 bu.	15.17 bu.	10. bu.
Total	16	1.6	.....	.....	.....	.....

1919

Corn	56	5.6	25,153	60.30 bu.	75.78 bu.	39.28 bu.
Oats	8	.8	1,053	41.25 bu.	46.87 bu.	24.43 bu.
Barley	1	.1	115	23.96 bu.	.....	.....
Wheat	23	2.3	4,053	29.38 bu.	34.66 bu.	23.16 bu.
Hay (soybean)	10	1.	3,730	1.86 tons	2.4 tons	1.35 tons
Total	.....	9.8	.....	.....	.....	.....

FIELD CROPS

	1918			1919		
	Acres	Total yield pounds	Yield per acre	Acres	Total yield pounds	Yield
Corn	21.5	47,000	31.73 bu.	42.76	146,855	44.36 bu.
Silage corn	.....	.....	.....	6.01	59,000	9.83 tons
Oats	25.5	36,160	44.31 bu.	4.	6,400	50. bu.
Wheat	9.5	7,920	13.89 bu.	23.11	22,680	16.36 bu.
Hay (mixed)	69.	253,200	1.68 tons	44.66	120,000	1.37 ton
Total	125.5	.....	.....	120.54	.....	.....

	1918	1919
Number work horses	4	4
Number of crop acres per work horse	31.89	65.07
Hours of man labor for year beginning March 1	5,233*	6,945
Hours of horse labor for year beginning March 1	4,265	4,375

*Part of the labor employed in drainage and building.

ANNUAL REPORTS, MADISON COUNTY EXPERIMENT FARM FOR 1918 AND 1919

R. E. BARKER

1918

PERSONNEL

Foreman H. W. Rogers was promoted to the position of Superintendent of County Experiment Farms on November 1, and was succeeded as foreman by J. K. Sites on December 1.

PERMANENT IMPROVEMENTS

Besides the tenant house, which was completed shortly after the beginning of the year, a new 6-room house with basement has been erected for the foreman. The contract price for this house was $3,485, which included everything from a furnace to paint except the hauling of material and excavating for the basement. The only plumbing done was the "roughed-in plumbing." Afterwards a 150-barrel cistern was put in and a well was drilled and fitted with a pump.

About 1,710 rods of drain tile have been laid in the farm where most needed; particularly under what are to be the experimental plots.

EXPERIMENT WORK

A block of 13 fertility plots was permanently located, fertilized and seeded to wheat in September. A block of 10 variety plots was temporarily located and seeded to varieties of wheat in September.

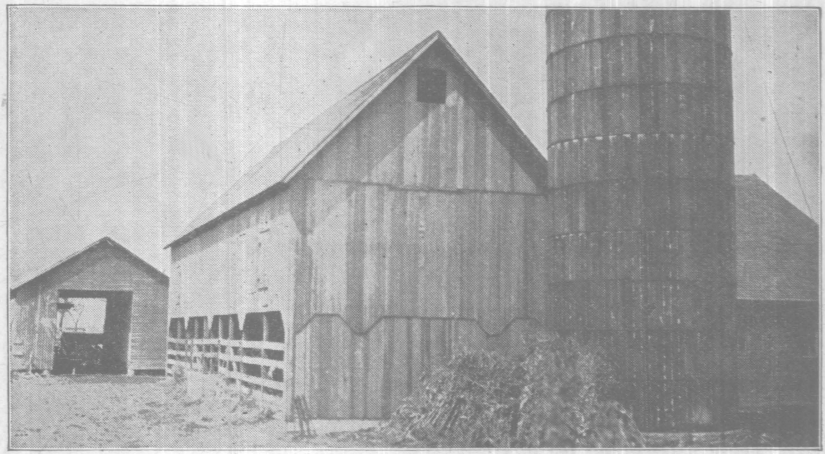
1919

EXPERIMENT WORK

Forty-six one-tenth acre fertility plots were started this year in the two fertility rotations. Twenty-six of the plots were a continuation of the rotation started on the livestock division of the farm last fall, beginning with the wheat plots. The new plots grew corn last season, and one block of 13 plots was put to wheat last fall. The remaining 20 plots were the beginning of a new rotation on the grain division of the farm, and all grew corn last season. One block of the 10 plots was also put to wheat in the fall.

The variety tests of grains and soybeans were continued, but the plots were laid out in a new permanent location and a definite rotation of corn, oats, soybeans and wheat established. A mixture of clovers is to be seeded in both the oats and wheat crops to be plowed down for the succeeding crops.

Laborer's house, Madison County Experiment Farm



New silo and addition to barn, Madison County Experiment Farm

With the purpose of carrying out the original plans for the farm arrangements were made for feeding out 20 head of steers during the winter and early spring months. The farm not having sufficient funds with which to purchase the cattle, after having made accommodations for feeding, an agreement was made with C. F. Sanford, whereby he was to purchase cattle and hogs for the farm to feed. The agreement specified that the farm was to receive 90 percent and Mr. Sanford 10 percent of the gain made in the feed lot; also that the farm was to assume 90 percent and Mr. Sanford 10 percent of the risk while in the feed lot.

FIELD CROPS

About 20 acres of corn were grown on the livestock division, averaging about 55 bushels per acre. Twenty-eight acres of corn land was rented for grain rent on the grain division that yielded about 50 bushels per acre. Twenty-six acres of good clover hay was harvested that yielded about 1½ tons per acre, and about 16 acres of timothy yielding 1½ tons per acre. Four acres of oats threshed 200 bushels. Fifteen acres of wheat on the grain division yielded only about 12 bushels per acre. However, that particular field is probably the poorest land on the farm. Nine acres of pure Gladden wheat was grown on the livestock division that made about 23 bushels per acre. By cooperation with the county agricultural agent all of the Gladden wheat, after being thoroughly cleaned, was sold to farmers in the county for seed.

PERMANENT IMPROVEMENTS

A redwood stave silo, 12 by 30 feet, has been erected at a total cost, including farm labor, of $480. The foundation consists of concrete in the ground and two rows of cement blocks above ground. A metal chute 25 feet long has been built to the silo. A feeding barn, 20 by 60 feet, is joined to the silo and old barn. It is 16 feet to the square with a loft 8 feet from the floor which affords a good-sized mow space. The entire floor is concreted, making it possible to save all the manure. The entire south side of the barn is left open with the exception of gates that keep the cattle confined to the barn.

A water system has been installed, consisting of a 1½ horse-power gasoline engine, a three-way pump, and a pipe line extending from the barnlot well to a cement tank at the feed barn. This makes it easy to keep fresh water before the cattle all the time.

A new county ditch has been completed through the farm, which gives a splendid outlet for all of the farm drains. Connections between this ditch and all the farm mains have been made.

A 4-ton wagon scale has been installed. A detailed survey of the farm was completed in the fall of 1919, and maps were made from the survey that show the size and location of all fields and plots and the location and size of all new tile drains.

COST ACCOUNTING WORK

Detailed cost accounts with all fields, experimental blocks, permanent improvements, livestock and all other farm enterprises have been kept during the past year insofar as such charges for labor, seeds, fertilizers, twine and building material go. Other charges, such as tools, overhead expenses, and rent of land have not been taken account of.

Much useful information has been accumulated concerning the cost of permanent improvements added to the farm, and the relative costs, labor costs especially, of growing different crops and of performing different operations on the farm. For instance, it was found that last year it cost $18.59 per acre to cut and husk corn and put the corn and stover into the barn; while it cost $26.24 per acre to put an acre of the same kind of corn into the silo. Again it was found that it required 34 man hours and 59 horse hours to grow and harvest an acre of corn (corn husked on stalk), while an acre of oats required 19½ man hours and 23½ horse hours for growing and harvesting. Thus it took about twice as much labor to grow corn as oats.

PUBLICITY

During the latter part of June an attempt was made to hold the first annual wheatfield day on the farm, but due to a very rainy day, the attendance was very small. At this meeting Professor L. A. Landis, of the Ohio State University, paid a deserved tribute to the memory of Miss Adah Bertha Coover, the donor of the farm.

Later in the season, during October, the Madison County Farmers' Club held a meeting at the farm. Again extremely bad weather prevailed and the attendance was small. Occasionally, some visitors have stopped at the farm, but altogether the number of people who have visited the farm, whether singly or at meetings, has been comparatively small.

THE MAINTENANCE OF SOIL FERTILITY

C. E. THORNE

Two experiments with fertilizers and manure have been planned for this farm, the cropping in each case being a 4-year rotation of corn, corn, wheat and clover. The plan of treatment in these experiments is shown in Table 123.

Three crops have been grown in this test, one each of corn and wheat in Rotation I, the wheat, however, not yet having had the residual effect from treatment of a previous corn crop, and one crop of corn in Rotation II, the land for this rotation not having been ready until the spring of 1919.

It is of course too early to attempt to draw any conclusions from this test, except that the land appears to be quite ready to respond to fertilization.

TABLE 123.—Plan of fertilizing, Madison County Experiment Farm

Pounds of fertilizing materials per acre

Plot	On Corn—first crop				On wheat				Total fertilizing constituents		
	Acid phosphate	Muriate potash	Nitrate soda	Manure	Acid phosphate	Muriate potash	Nitrate soda	Manure	Ammonia	phosphoric acid	Potash
Rotation I: Corn-corn-wheat-clover. Livestock division											
1											
2	160				160					50	
3	160	80			160	80				50	80
4											
5	160	80	30		160	80	30		12	50	80
6				4 T.				4 T.[1]	100	50	80
7											
8	760[1]			4 T.[1]	160[1]			4 T.[1]	100	100	80
9	320[1]			8 T.[1]					100	100	80
10											
11	180[2]			2 T.[1]	260				25	80	20
12	500[3]				500[3]				20	80	20
13											
Rotation II: Corn-cornwheat-clover. Grain farming division											
1											
2	160				160						
4	160	12			160	12				50	
4											12
5	160	12	20		160	12	30		12	50	12
6	160	12	30	4	160	12	30			50	12
7											
8	300[3]				300[3]				12	50	12
9	1,000[5]									270	
10											

[1]Mixed with manure—"Phosphated manure."
[2]80 pounds mixed with manure.
[3]2-8-2.
[4]1,000 pounds powdered limestone.
[5]Raw phosphate.

TABLE 124.—Fertilizers, manure and limestone in corn-corn-wheat-clover rotation. Madison County Experiment Farm, 1919

Plot	Treatment per acre	Yield		Increase		Plot
		Grain	Stover or straw	Grain	Stover or straw	
	Corn, first crop, livestock farming. Block C					
		Bu.	*Lb.*	*Bu.*	*Lb.*	
1	None	51.57	2,200	.....	.....	1
2	Acid phosphate, 160 lb	58.00	2,540	4.62	367	2
3	Acid phosphate, 160 lb.; muriate potash, 80 lb	60.64	2,880	5.45	733	3
4	None	57.00	2,120	.....	.....	4
5	Acid phos., 160 lb.; mur. pot., 80 lb.; nit. soda, 30 lb.	66.57	2,840	7.71	687	5
6	Manure, untreated, 4 tons	62.79	2,960	2.08	773	6
7	None	52.57	2,220	.....	.....	7
8	Manure, phosphated, 4 tons	68.93	2,900	6.38	480	8
9	Manure, phosphated, 8 tons	68.71	3,360	6.19	740	9
10	None	62.50	2,820	.....	.....	10
11	Manure, phosphated, 2 tons; acid phosphate, 100 lb*	70.43	3,160	6.98	307	11
12	Fertilizer 2-8-2, 500 lb	70.29	3,500	5.88	613	12
13	None	65.36	2,920	.....	.....	13
	Average unfertilized yield	59.80	2,456	.....	.....	
	Wheat, livestock farming. Block A					
1	None	27.33	3,780	.....	.....	1
2	Acid phosphate, 160 lb	30.58	4,105	4.14	365	2
3	Acid phosphate, 160 lb.; muriate potash, 80 lb	31.17	4,010	5.61	310	3
4	None	24.67	3,660	.....	.....	4
5	Acid phos., 160 lb.; mur. potash, 80 lb.; nit. soda, 30 lb	30.75	4,175	6.58	712	5
6	Manure, untreated, 4 tons	25.92	3,665	2.25	398	6
7	None	23.17	3,075	.....	.....	7
8	Manure, phosphated, 4 tons	29.08	3,515	5.80	518	8
9	Acid phosphate, 320 lb	32.25	3,465	8.86	542	9
10	None	23.50	2,850	.....	.....	10
11	Acid phosphate, 180 lb†	31.25	3,325	7.58	238	11
12	Fertilizer 2-8-2, 500 lb	29.75	3,755	5.92	432	12
13	None	24.00	3,560	.....	.....	13
	Average unfertilized yield	24.53	3,384	.....	.....	
	Corn, grain farming. Block L					
1	None	58.64	2,200	.....	.....	1
2	Acid phosphate, 160 lb	72.07	2,640	10.69	193	2
3	Acid phosphate 160 lb.; muriate potash, 12 lb	70.86	2,260	6.74	—443	3
4	None	66.86	2,940	.....	.....	4
5	Acid phos., 160 lb.; mur. pot., 12 lb.; nit. soda, 30 lb.	71.00	2,720	3.55	—113	5
6	Acid phos., 160 lb.; muriate potash, 12 lb.; nitrate soda, 30 lb.; limestone, 1,000 lb	68.29	2,860	.24	133	6
7	None	68.64	2,620	.....	.....	7
8	Fertilizer, 2-8-2, 300 lb	69.21	3,240	4.16	593	8
9	Floats, 1,000 lb	57.29	2,540	—4.16	—133	9
10	None	57.86	2,700	.....	.....	10
	Average unfertilized yields	63.00	2,615	.....	.....	

*In addition to the phosphate in the manure.
†To be 260 pounds hereafter.

COMPARISON OF VARIETIES

DEPARTMENT OF AGRONOMY

CORN

Seven varieties of corn have been tested two seasons with the results indicated in the table. Darke County Mammoth has given the largest yield, Leaming (P. D.) second and Ohio 84 third.

TABLE 125.—Comparison of varieties of CORN, Madison County Experiment Farm

	Yield per acre			Average	
	1917	1918	1919	Grain	Stover*
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lb.*
Darke Co. Mammoth	70.03	.....	48.89	59.46	2,100
Leaming P. D.	62.47	.....	43.79	53.13	1,300
Cook's 75	51.43	.....	49.77	50.60	2,120
Ohio 84	63.38	.....	42.27	52.82	1,500
White Cap	56.17	.....	43.62	49.89	1,860
Yellow Leaming (Local)	61.60	.....	.....	.....	.....
Clarage	60.46	.....	43.34	51.90	1,530
Johnson Co. White	.....	.....	43.19	.....	2,780

*For 1919 only.

OATS

Six varieties of oats have been tested for two seasons and three varieties for three seasons. Averaging the two seasons' tests for the sake of the larger number of varieties, the Silvermine leads slightly in yield, with Ohio 6203 second and the Big Four third. The Oderbrucker barley has averaged 23.38 bushels per acre and the Blue Ribbon spring wheat 14.17 bushels.

TABLE 126.—Comparison of varieties of OATS, Madison County Experiment Farm

Variety	Yield per acre			2-year average	
	1917	1918	1919	Grain	Straw
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lb.*
Wideawake	55.83	38.75	39.63	47.73	2,025
Ohio 7009	58.73	.....	28.85	43.79	890
Ohio 6203	59.59	.....	45.57	52.58	1,600
Ohio 6222	54.51	.....	41.81	48.16	1,745
Big Four	59.19	37.34	44.59	51.89	1,855
Silver Mine	60.05	37.19	46.11	53.08	1,700
Oderbrucker Barley	22.81	12.71	23.96	23.38	2,015
Blue Ribbon Spring Wheat	24.17	.....	4.17	14.17	1,510

WHEAT

Seven varieties of winter wheat have been tested two seasons. Ohio 9920 has given the largest yield, Red Wave second, Gladden third and Nigger fourth.

TABLE 127.—Comparison of varieties of WHEAT, Madison County Experiment Farm

Variety	Yield per acre		Average	
	1918	1919	Grain	Straw*
	Bu.	*Bu.*	*Bu.*	*Lb.*
Velvet Chaff	13.12	32.20	22.66	5,141
Nigger	13.51	31.53	22.52	3,980
Gladden	13.57	32.20	22.88	4,950
Ohio 8106	10.40	28.42	19.41	4,485
Trumbull	16.51	28.14	22.32	3,920
Ohio 9920	16.73	34.97	25.85	4,200
Red Wave	15.18	32.40	23.79	4,885

*For 1919 only.

SOYBEANS

A test of soybeans for seed production was conducted in 1917. Ohio 9100 gave the largest yield, Elton second, and Ohio 9016 third.

In 1919 a test of soybeans for hay was conducted with the result that the Cloud variety gave the largest yield, Auburn second and Medium Green third.

TABLE 128.—Comparison of varieties of SOYBEANS, Madison County Experiment Farm

Variety	Yield per acre	
	1917 Grain	1919 Hay
	Bu.	*Lb.*
Ohio 9100	18.66	3,500
Elton	15.67	.....
Ebony	13.78	3,560
Ohio 9035	12.06	3,340
Ohio 9016	15.29	.....
Medium Green	14.67	3,915
Auburn	.....	4,100
Cloud	.....	4,440
Mammoth Yellow	.....	2,700
New Era cowpea	2.50	.....

WORK OF THE COUNTY EXPERIMENT FARMS

CARY W. MONTGOMERY

A study of the work of the farms described in the preceding pages can but impress the reader that climatic conditions, soil type, topography of the land, market and roads have a great influence in determining the system of farming that should be followed.

Not only is the maintenance of fertility a local matter, as stated by Director Jordan (see introduction Bulletin 465, page 31, New York State Experiment Station), but also the crops that should be grown, the rotations followed, whether livestock should be kept or not, and the kind of livestock to be kept.

Referring to the hog summaries for 1919 on the Paulding and Miami County Experiment Farms, it will be noted that a loss was incurred at both farms, while at the Hamilton County Experiment Farm a profit was made. This difference was not because of the better management of the herd on the Hamilton County Experiment Farm as compared with the other two farms, but because of the better price received for the bulk of the hogs. The farm price received for the bulk of the hogs in 1919 at the Hamilton County Experiment Farm was $16.80; at the Miami County Experiment Farm, $14; and at the Paulding County Experiment Farm 16 hogs sold for $19.50 and 38 hogs for $13.75 per 100 pounds.

The part that the market plays is further emphasized by a study of Table 129, "Progress of the Dairy Herd on the Trumbull County Experiment Farm."

Notwithstanding that the production of milk per cow was 2,006 pounds greater in 1919 than in 1917, the net gain was less than for the previous year, because the price of milk had not advanced equally with the price of labor and feed.

The object and purpose of the dairy herds on the Hamilton and Trumbull County Experiment Farms are the same, to develop a healthy, high-producing herd and a cropping system that will furnish a large amount of cheap food that in turn will produce a large amount of milk.

The milk from the herd at the Trumbull County Experiment Farm goes to Pittsburgh. A price per 100 pounds is paid for 3.5 percent milk, with 5 cents per 100 pounds off for each point below 3.5 percent, and 5 cents advance for each point above 3.5 percent. We have received at times $4 per 100 pounds for 3.5 percent milk, but for easy calculation call it $3.50; that would be 10 cents for each point of butterfat up to 3.5 percent and 5 cents for each point

above. So why should we keep a cow giving 5 percent to 6 percent milk? On the other hand, on the Hamilton County Experiment Farm we sell butterfat at a uniform price. The higher the percent of butterfat in the milk the less manipulation of the cow's udder is required to realize a certain amount of money. Most of the cows at the Trumbull County Experiment Farm are Holsteins, while Jerseys are kept at the Hamilton County Experiment Farm.

A comparison of the receipts from cucumbers on the Washington County and Mahoning County Experiment Farms, the acreage being the same, shows a 2-year average of $396.70 per acre from the Washington County Experiment Farm, and $69.36 from the Mahoning County Experiment Farm. At the Mahoning County farm the soil is not adapted to the growing of early cucumbers and by the time the cucumbers are ready to market the appetite of the consumer has been supplied by districts like Marietta that can produce an earlier crop.

From a study of these experiment farms, it would seem that successful farming is largely a matter of the farmer knowing his environment and adapting himself thereto.

TABLE 129.—Progress of the dairy herd on the Trumbull County Experiment Farm

	1917	1918	1919
Milk produced per cow, pounds	6,573	7,086	8,579
Value of milk per cow dollars	168.59	215.36	276.37
Feed cost per cow dollars	97.25	104.34	145.20
Total cost of herd dollars	3,448.61	3,894.03	4,911.91
Total receipts of herd dollars	3,737.26	4,143.85	4,920.16
Gain or loss on herd* dollars	288.65	249.82	8.25

*All receipts and expenses, including difference in inventories, overhead expenses, purchases and sales, interest on investment and value of manure are included.

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APPENDIX

SUMMARY OF EXPERIMENTS WITH FERTILIZERS AND VARIETIES OF GRAINS

Table 130 summarizes the experiments made on the different farms with acid phosphate used alone, or reinforced with muriate of potash and nitrate of soda.

The table shows that, at the valuations employed, acid phosphate has been used alone with a large profit in every case except on the Paulding County soil; that the reinforcement with muriate of potash has frequently reduced the net gain, with muriate computed at $150 per ton, with generally a still further reduction when nitrate of soda has been added to the muriate.

As the cost of potassium and nitrogen is less in these salts than in mixed fertilizers, at the prices usually demanded for such fertilizers, it follows that their purchase cannot be recommended.

The results of the variety tests are summarized in Tables 131-134.

Of the eight different varieties of corn tested on the district and county experiment farms the Darke County Mammoth, Leaming and Clarage have given very general satisfaction, and under the most favorable conditions, also the Reid.

Among the different varieties of oats tested the Silver Mine, Ohio 6203, Big Four, Sixty Day and Ohio 6222 are in the lead.

Of the old standard varieties of wheat the Gypsy, Poole, Fultz, Valley and Mediterranean are among the best, while of the newer sorts, the Gladden, Trumbull and Portage have merit.

The most valuable varieties of soybeans are the Elton, Ebony, Ohio 9016, Ohio 9035 and Mongol.

TABLE 130.—Summary of experiments with fertilizers

Station	Duration of test	Fertilizer annually per acre			Increase per acre				Annual value of increase[1]	Annual cost of fertilizers	Annual net gain or loss (—)
		Acid phosphate	Muriate potash	Nitrate soda	Corn	Oats	Wheat	Hay			
	Year				Bu.	Bu.	Bu.	Lb.	Doll.	Doll.	Doll.
Acid phosphate alone											
Wooster	26	64	.....	.....	7.34	9.18	8.05	824	6.08	.96	5.12
Strongsville	25	64	.....	.....	7.19	10.14	6.74	1,018	6.15	.96	5.19
Germantown	16	80	.....	.....	6.88	.....	5.27	684	6.62	1.20	5.42
Carpenter	16	80	.....	.....	8.00	.....	6.22	339	6.24	1.20	5.04
Findlay	10	90	.....	.....	5.77	5.18	4.89	619	5.11	1.35	3.76
Miami Co.[4]	9	125	.....	.....	10.34	8.52	11.62	708	9.13	1.87	7.26
Paulding Co.[5]	8	125	.....	.....	—1.80	—2.03	2.08	466	1.35	1.87	—.52
Clermont Co.[5]	6	125	.....	.....	3.58	[3]3.61	6.02	342	4.09	1.87	2.22
Hamilton Co.	7	125	.....	.....	4.24	[3]1.75	7.63	317	5.33	1.87	3.46
Washington Co[6]	5	125	.....	.....	3.91	.....	4.22	531	4.86	1.87	2.99
Trumbull Co.	4	125	.....	.....	4.14	6.45	11.82	1,148	8.89	1.87	7.02
Mahoning Co.[7]	2	125	.....	.....	4.44	6.09	15.32	461	8.49	1.87	6.62
Belmont Co.	3	120	.....	.....	6.27	.....	6.44	.....	2.87	1.80	1.07
Madison Co[7]	1	80	.....	.....	7.66	.....	4.14	.....	2.99	1.20	1.79
Acid phosphate and muriate of potash											
Wooster	26	64	52	.....	15.96	12.75	9.43	1,520	9.54	4.08	5.46
Strongsville	25	64	52	.....	9.43	9.89	7.70	979	6.67	4.08	2.59
Germantown	16	80	13.3	.....	12.37	.....	7.11	831	9.42	2.00	7.42
Carpenter	16	80	13.3	.....	10.00	.....	7.87	540	8.23	2.00	6.23
Findlay	10	90	15	.....	9.17	4.47	6.16	937	6.93	2.25	4.68
Miami Co.[4]	9	125	22.5	.....	13.57	10.82	14.06	768	11.09	3.22	7.87
Paulding Co.[5]	8	125	22.5	.....	—2.70	1.52	3.68	280	1.76	3.22	—1.46
Clermont Co.[5]	6	125	22.5	.....	10.47	[3]1.87	7.33	379	6.60	3.22	3.38
Hamilton Co.	7	125	22.5	.....	12.56	[3]2.57	8.16	546	8.06	3.22	4.84
Washington Co.[6]	5	125	22.5	.....	4.77	.....	3.13	544	4.57	3.22	1.35
Trumbull Co.	4	125	10	.....	5.81	9.26	12.39	324	7.70	2.47	5.23
Mahoning Co.[7]	2	125	10	.....	9.24	9.12	17.08	909	11.55	2.47	9.08
Belmont Co.	3	120	9.6	.....	4.45	.....	6.97	.....	2.76	2.38	.38
Madison Co.[7]	1	80	23	.....	6.10	.....	5.61	.....	3.25	2.58	.67
Acid phosphate, muriate of potash and nitrate of soda											
Wooster	26	64	52	96	19.64	19.04	16.53	2,383	14.57	8.88	5.69
Strongsville	25	64	52	96	11.32	14.77	10.69	1,165	8.71	8.88	—.17
Germantown	16	80	13.3	53.3	14.28	.....	9.77	789	11.09	4.67	6.42
Carpenter	16	80	13.3	53.3	13.33	.....	10.74	725	11.12	4.67	6.45
Findlay	10	90	15	40	6.46	4.43	6.00	654	5.65	4.25	1.40
Miami Co.[4]	9	125	22.5	40	11.37	10.33	14.92	571	10.45	5.22	5.23
Paulding Co.[5]	8	125	22.5	40	1.09	2.01	6.64	142	3.30	5.22	—1.92
Clermont Co.[5]	6	125	22.5	40	13.12	[3]3.00	11.30	631	9.77	5.22	4.55
Hamilton Co.	7	125	22.5	40	9.42	[3]2.20	9.33	554	7.75	5.22	2.53
Washington Co.[6]	5	125	22.5	40	5.83	.....	7.28	405	6.45	5.22	1.23
Trumbull Co.	4	125	10	27.5	4.82	11.30	12.58	526	8.35	3.85	4.50
Mahoning Co.[7]	2	125	10	27.5	13.06	11.21	17.74	839	12.60	3.85	8.75
Belmont Co.	3	120	9.6	24	3.81	.....	8.03	.....	2.98	3.58	—.60
Madison Co.[7]	1	80	23	15	5.63	.....	6.58	.....	3.52	3.33	.19
Average unfertilized yields					39.34	42.77	14.84	2,471	8.31	5.15	3.16

[1]Valuations: Corn, 75c per bushel; oats, 50c per bushel; wheat, $1.50 per bushel; soybeans, $2 per bushel; hay, $20 per ton.

[2]Valuations: Acid phosphate, $30 per ton; muriate of potash, 6c per pound; nitrate of soda, 5c per pound.

[3]Soybeans.

[4]Average of four duplicate tests with corn, two each with oats and wheat and three with hay.

[5]Average of two duplicate tests.

[6]Soybeans, which were cut for hay in Washington County rotation, are not included.

[7]Average of three duplicate tests.

TABLE 131.—Wheat variety tests. Yield in bushels per acre

Variety	Wooster	Germantown	Carpenter	Hancock	Miami	Hamilton	Paulding	Clermont	Trumbull	Strongsville	Mahoning	Washington	Belmont	Madison
	11 yrs.	9 yrs.	10 yrs.	4 yrs.	7 yrs.	7 yrs.	6 yrs.	6 yrs.	4 yrs.	4 yrs.	3 yrs.	4 yrs.	2 yrs.	2 yrs.
Fultz	34.96	23.84	27.32	17.16	29.48	.....	.....	.....	34.61	.....	34.92	.....	.....	.....
Trumbull	36.78	25.65	28.46	23.50	33.30	.....	34.89	.....	33.32	34.94	31.46	17.22	34.33	22.32
Poole	35.91	25.22	27.91	18.55	30.44	.....	.....	.....	32.00	.....	29.08	.....	.....	.....
Portage	37.79	26.18	30.90	.....	32.02	27.39	31.88	15.83	32.36	.....	29.48	.....	.....	.....
Gypsy	33.77	24.76	27.10	19.23	33.71	.....	.....	.....	.....	.....	32.44	.....	.....	.....
Gladden	37.96	24.90	28.69	24.68	35.17	32.21	32.52	18.02	37.52	33.49	32.50	21.38	35.07	22.88
Mediterranean	32.95	22.48	27.74	20.27	31.18	29.70	27.50	16.90	26.61[3]	32.04	.....	23.17	.....	.....
Turkey Red	28.95	22.05	25.64	15.24	29.45	29.76	33.26	11.96	.....	.....	.....	.....	.....	.....
Valley	35.43	23.46	29.98	.....	32.74	.....	.....	.....	36.25	.....	32.29	.....	.....	.....
Goens	34.89[7]	.....	.....	.....	31.24	28.12	28.23	.....	29.66	.....	24.87	.....	.....	.....
Nigger	35.65	24.49	27.72	16.92	30.78	25.65	31.46	16.71	29.53	32.70	28.67	21.41	28.01	22.52
Dawson's Golden Chaff	38.79	25.27	.....	22.07	.....	.....	.....	.....	34.33	.....	29.78	.....	.....	.....
Red Wave	36.94	.....	.....	.....	.....	30.11	.....	.....	33.54	34.40	29.25	15.70	33.01	23.79
Velvet Chaff	32.27	22.78	25.85	14.85	30.33	27.58	30.09	16.14	30.48	28.85	27.03	17.58	31.50	22.66
Ohio 9920	40.68[6]	28.04[4]	34.94[3]	20.21	20.61[4]	32.63[4]	.....	.....	34.95	34.76	33.78	20.02	30.98	25.85
Ohio 127	42.93[4]	23.75[3]	.....	.....	.....	34.29[3]	.....	.....	38.76[3]	.....	32.76	.....	34.54	.....
Rudy	35.04	24.33	28.23	.....	31.04	.....	31.00	14.60	.....	.....	.....	.....	.....	.....
Spring wheat	16.05[10]	.....	7.33[2]	17.83	13.83[2]	10.66[2]	6.67[1]	.....	17.69	23.18[3]	13.27[4]	.....	9.67[3]	14.17[2]

TABLE 132.—Summary of variety tests of oats. Yield in bushels per acre

Variety	Wooster 15 years	Carpenter 9 years	Hancock 9 years	Miami 8 years	Hamilton 7 years	Paulding 8 years	Clermont 6 years	Trumbull 5 years	Strongsville 4 years	Mahoning 4 years	Belmont 2 years	Madison 2 years
Big Four	68.05	.....	46.02	63.20	48.51	65.03	29.29	53.14	75.92	52.17	67.47	51.89
Silver Mine	69.13	.....	48.82	61.04	45.87	58.01	26.43	54.93	76.47	53.52	59.14	52.08
Ohio 7009	67.24[10]	.....	43.35	58.78	40.36	54.94	27.35	46.39	65.01	43.30	45.31	43.79
Ohio 6203	70.43[10]	34.07	48.40	63.51	40.36	59.85	26.42	52.99	67.67	56.25	64.07	52.58
Wideawake	59.20	29.82	42.07	57.86	41.58	52.44	24.81	48.77	69.19	45.44	56.32	47.73
Ohio 6222	69.06[10]	.....	51.48	62.78	43.32	67.73	23.79	49.74	70.66	57.18	62.66	48.16
Swedish Select	60.03	.....	46.93	58.84	40.57	57.26	23.38	50.17	72.91	46.40	.....	.....
Oderkrucker Barley	33.58	14.17[8]	24.25	35.60	22.75	37.33	.....	23.00	.....	19.14	26.25	23.38
Emmer	34.67	20.23[6]	33.10[7]	36.07	24.20[5]	.....	.....	26.74	.....	26.37	.....	.....
Sixty Day Ohio	68.65[11]	34.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sixty Day N. Dakota	71.54[11]	40.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Note: The small figures indicate the number of years the varieties have been tested.

TABLE 133.—Summary of variety tests of corn. Yields in bushels per acre

Variety	Wooster 14 years	Germantown 14 years	Carpenter 12 years	Hancock 8 years	Miami 8 years	Hamilton 7 years	Paulding 7 years	Clermont 7 years	Trumbull 4 years	Strongsville 4 years	Mahoning 2 years	Washington 6 years	Belmont 3 years	Madison 2 years
Leaming P. D.	72.65	60.06	54.58	57.99	55.91	52.63	60.01	23.72	46.68[1]	.....	.....	52.17	75.46	53.13
Darke Co. Mammoth	70.94	62.98	58.60	56.05	64.22	59.33	59.30	24.16	34.33[1]	.....	80.26	54.75	82.05	59.46
White Cap	64.97	53.26[7]	55.81[2]	42.66	56.21	50.83	50.17[4]	18.58	55.96	57.90	61.76	.....	66.53	49.89
Ohio 84	65.25	54.52[13]	50.73[10]	56.45	52.10	46.84	56.32	16.63	62.38	68.00	70.66	51.11	69.51	52.82
Medina Pride	78.87	.....	58.27[4]	50.74[4]	.....	.....	.....	.....	62.15	66.50	76.47	.....	.....	.....
Cook,s 75	69.79[10]	62.03[10]	55.43[10]	53.72	61.76	57.29	62.62	21.83	.....	.....	.....	64.13[5]	80.97	50.60
Clarage	66.94	55.00	48.90	51.83	57.02	51.68	58.61	21.97	66.32[3]	61.09	70.24	51.10	72.92	51.90
Ried (Orcutt)	77.15[12]	60.10[7]	53.81[7]	58.86[3]	61.36	58.38	59.47	23.63	.....	.....	.....	49.34[2]	.....	.....
Boone Co. White	71.66[10]	59.81	51.42	59.55	65.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leaming (Frost)	79.51[8]	.....	.....	.....	.....	.....	.....	.....	61.45	63.34	74.80	.....	.....	.....
Pride of the North	.....	.....	.....	.....	.....	.....	.....	.....	37.71	.....	64.67	.....	.....	.....
Golden Glow	.....	.....	.....	.....	.....	.....	.....	.....	61.19[3]	.....	68.76	.....	.....	.....
Minnesota No. 13	.....	.....	.....	.....	.....	.....	.....	.....	56.95[3]	.....	.....	.....	.....	.....
Calico (Stone)	.....	.....	.....	.....	.....	.....	.....	.....	52.93[3]	.....	.....	.....	.....	.....
Connor,s Prolific	.....	57.20[7]	50.79[5]	.....	52.61[4]	58.69[4]	.....	.....	.....	.....	.....	56.46[5]	.....	.....
Stauffer's Yellow Dent	.....	51.68[8]	50.96[8]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 134.—Summary of variety tests of soybeans. Yields in bushels per acre

Variety	Wooster 6 years	Carpenter 2 years	Miami 6 years	Hamilton 7 years	Paulding 6 years	Clermont 5 years	Trumbull 4 years	Mahoning 1 year	Washington 2 years	Belmont 2 years	Madison 1 year
Ohio 9100	20.6	16.52	18.11	15.01	15.30	5.69	14.98	6.53	14.97	10.28	18.66
Ebony	24.5	12.71	21.36	18.25	.....	7.55	15.70	8.01	12.25	8.37	13.78
Elton	27.2	14.36	22.28	15.64	20.71	7.16	13.31	3.38	15.84	11.93	15.67
Mongol	24.0	16.38	20.95	19.29	.....	8.30	13.30[3]	6.67	14.70	.....	.....
Ohio 9035	24.5	13.77	19.77	19.33	16.24[5]	5.87	.....	.....	16.73	7.63	12.06
Ohio 7496	28.0	.....	19.05	14.89[4]	13.98	.....	.....	1.60	.....	.....	.....
Ohio 9016	28.8	11.96	18.02	15.69	.....	.....	9.87	1.24	.....	12.33	15.29
Medium Green	24.3	9.80	17.98	13.57	11.30[5]	5.99	12.87	7.41	10.35	11.87	14.67
Manchuria	24.4	15.46	.....	.....	.....	.....	13.06[3]	3.49	.....	.....	.....
New Era Cowpea	7.5[3]	7.26	5.61	3.90	.....	1.04	Failure	.....	1.58	.....	2.50

Note: The small figures indicate the number of years the varieties have been tested.